WORLD PETROLEUM

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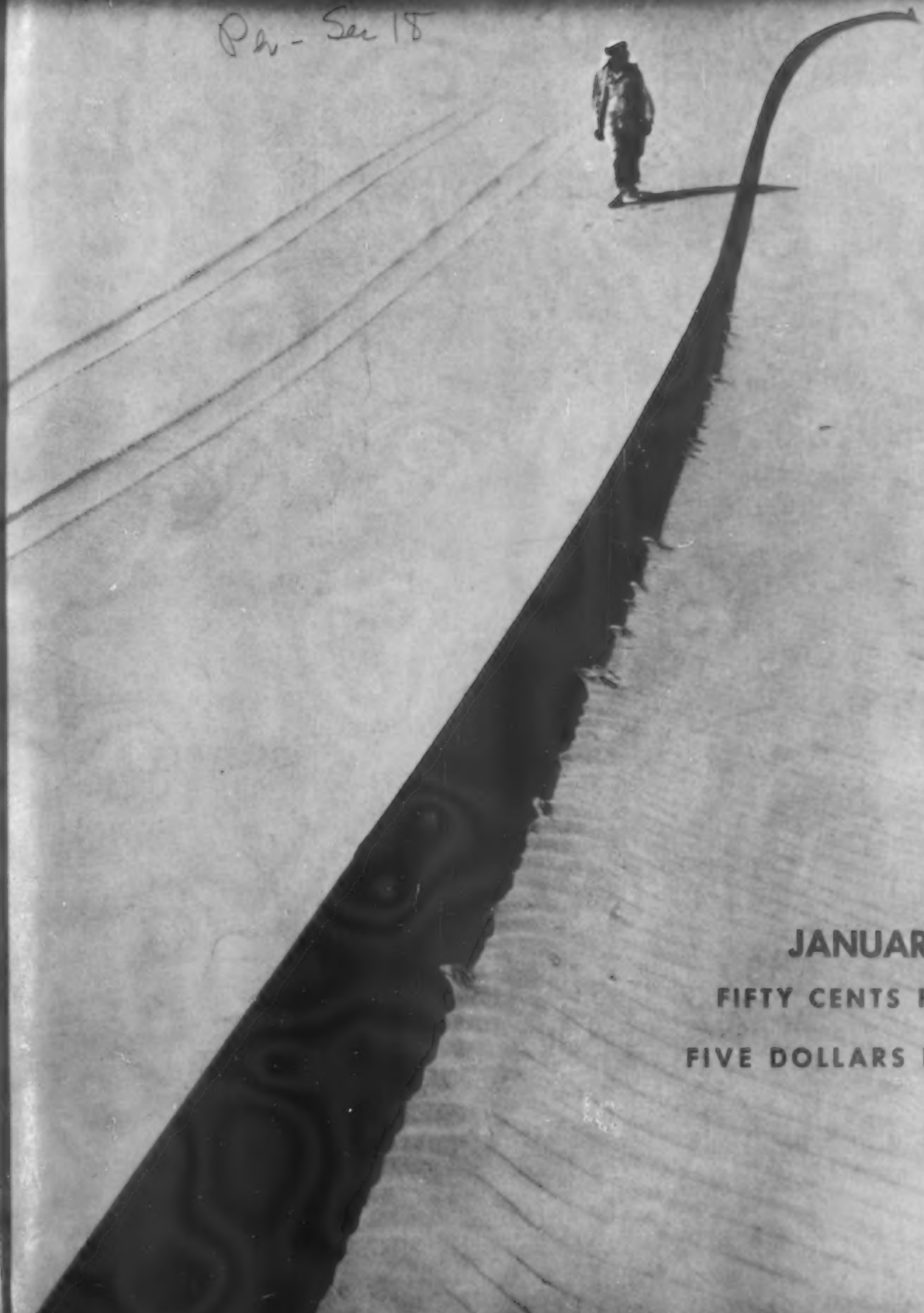

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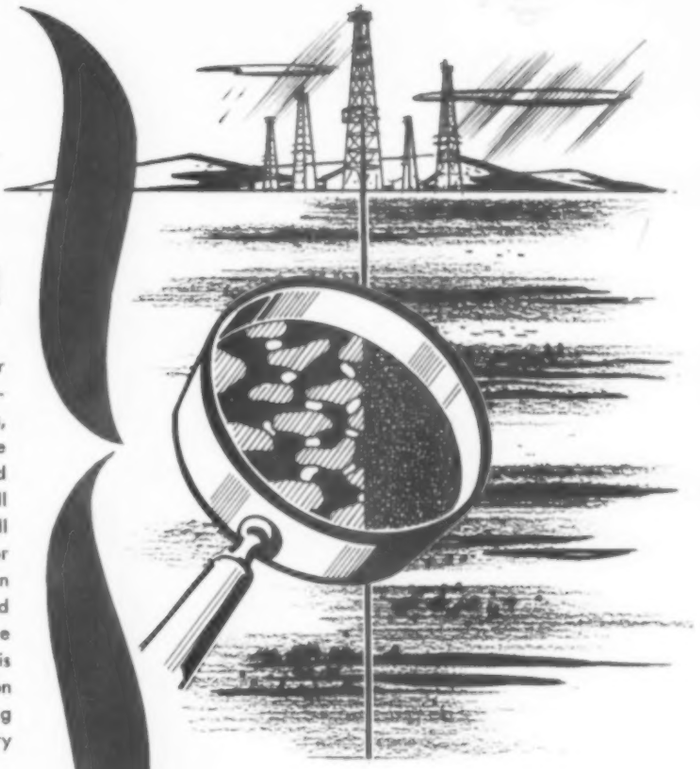
Why water is COSTLY...

IN THE PRODUCTION ZONE!



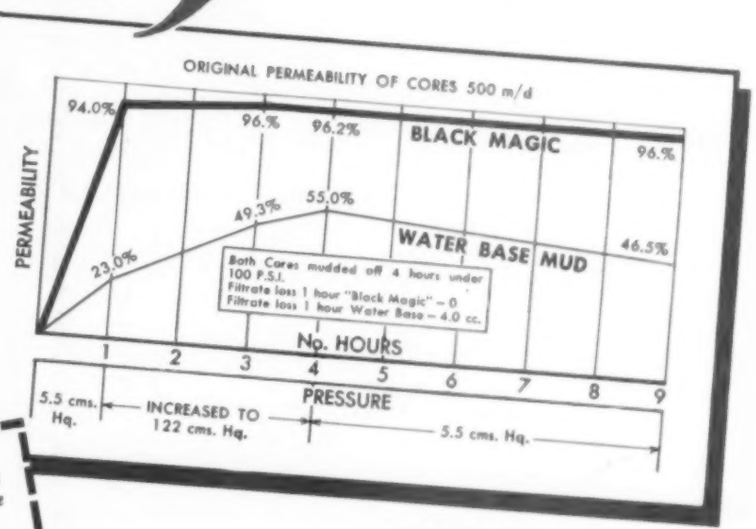
Schematic view of oil sands surrounding the zone of production showing how the surface tension of water particles locks them in the minute crevices thereby blocking off the flow of crude oil.

THE FILTRATE from a water base drilling fluid is water and, in many cases, water plus fine solid or silty materials or chemicals. This filtrate, common to all water base drilling fluids, is squeezed out of the mud and into the formation around the borehole because the pressure of the mud against the formation being drilled must be in excess of the formation pressure in order to control the well while drilling with rotary tools. This water remains in place until the well is brought on production. At this time "free" water is displaced by oil or gas. A quantity of the water will always remain held in place between the tiny particles of the formation by capillary action and is not dislodged even by excessive pressures. This locking of the particles of water in the crevices between the sand grains is known as "water blocking" and is due to Jamin action*. This water blocking decidedly restricts production and the ultimate recovery of oil from the well. The tighter the producing formation the more complete is this water blocking action. Even in very permeable formations this water blocking is still very detrimental.

"BLACK MAGIC" ELIMINATES WATER BLOCKING

Black Magic oil base drilling fluid as the comparative curves show, eliminates water blocking. There is *no* free water in Black Magic. While Black Magic has only a paper thin "cake," there is a zero filtrate loss. Due to elimination of water blocking, there can be no displacement of connate water in core samples. Accurate information for development evaluation is obtainable with Black Magic as with no other medium.

Consider some of the many other advantages of Black Magic: May be regenerated and used over and over again. Is not affected by salt, anhydrite, gypsum, limestone, or cement, therefore, no expensive chemicals are needed. "Heaving" or hydrous disintegrating shales remain in place due to Black Magic's perfect plastering and lack of water filtrate.



CURVES

Synthetic cores of 500 m/d mudded off—one with Black Magic, one with a starch treated clay mud. Cores were deplastered with simulated crude (80% white oil, 20% Kerosene) and permeability measured over a nine hour period. *Note approximate full recovery of original permeability in one hour by core mudded off with Black Magic.*

This is why your production is increased—*you are producing from all of the oil zone when you have used Black Magic*—instead of less than half of it due to water-blocking and mudding off with water base mud.

*We have available a number of reprints of technical papers describing Jamin action and its effect. Send in the coupon or write for your free copies of these informative papers.

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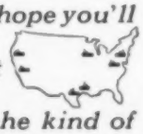
We hope you'll understand. And as more steel becomes available, we hope you'll remember that our seven modern drum plants and our coast-to-coast  *container service can solve your packaging problems by giving you the kind of containers you want, when and where you want them. Rheem, 570 Lexington Avenue, New York 22, N. Y.*

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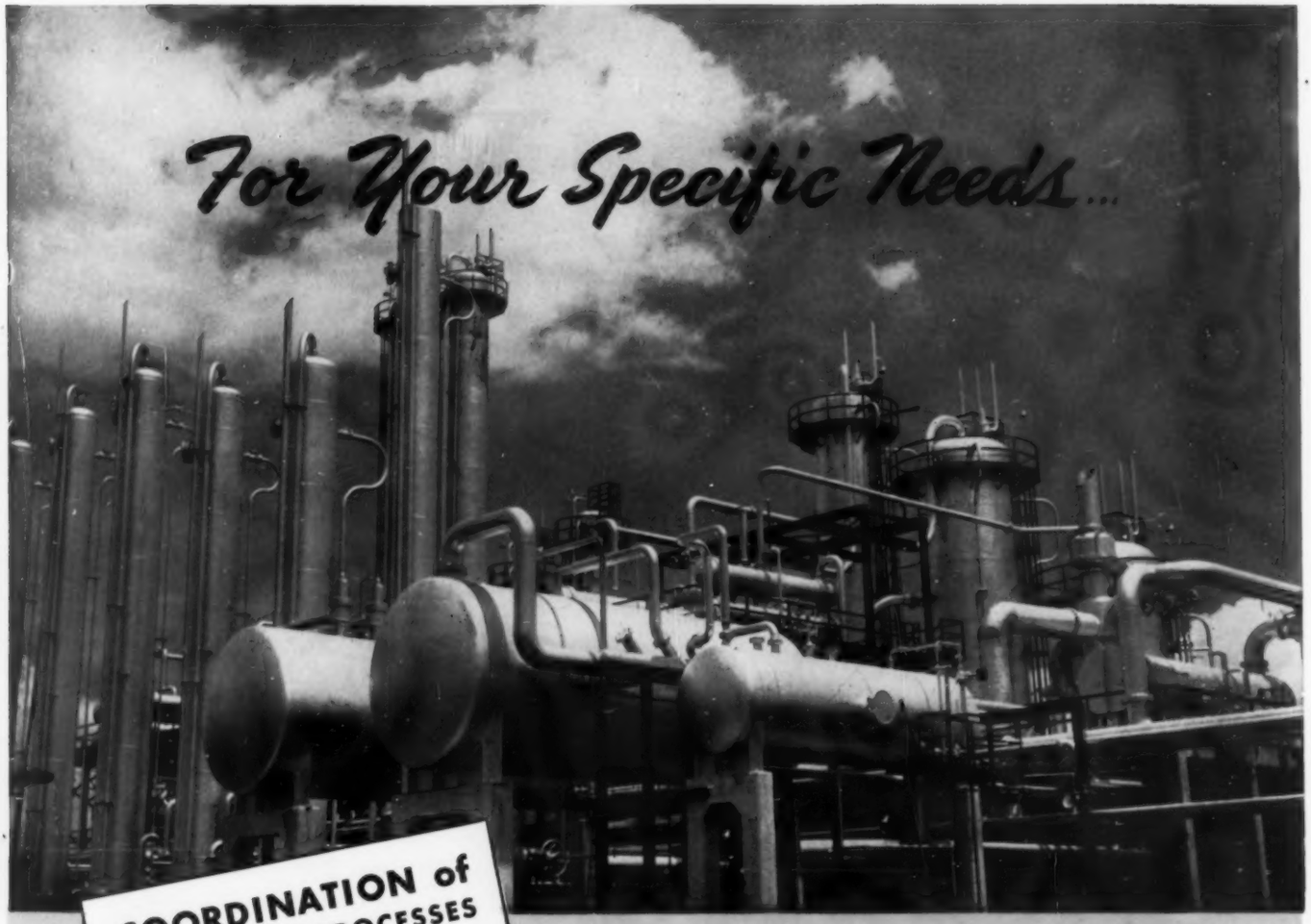

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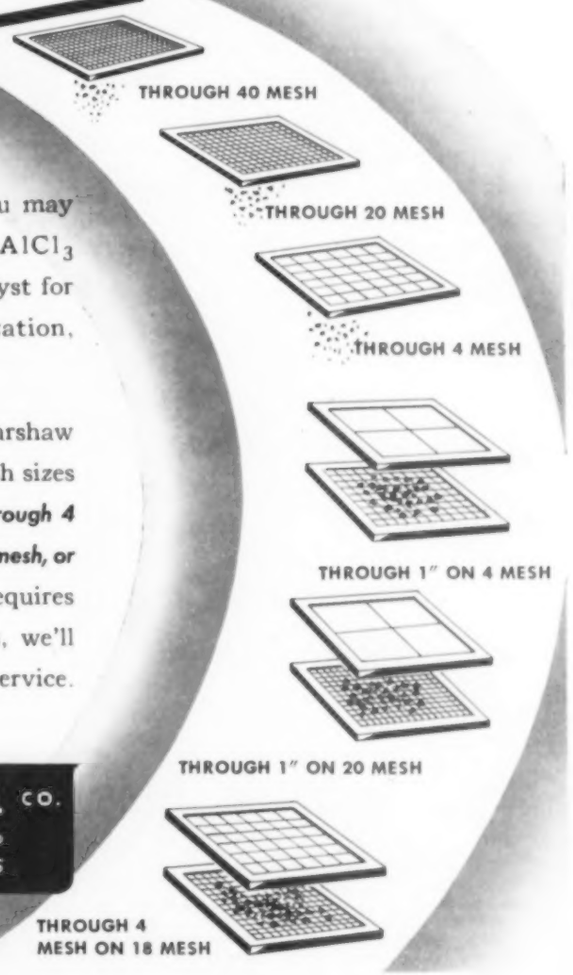

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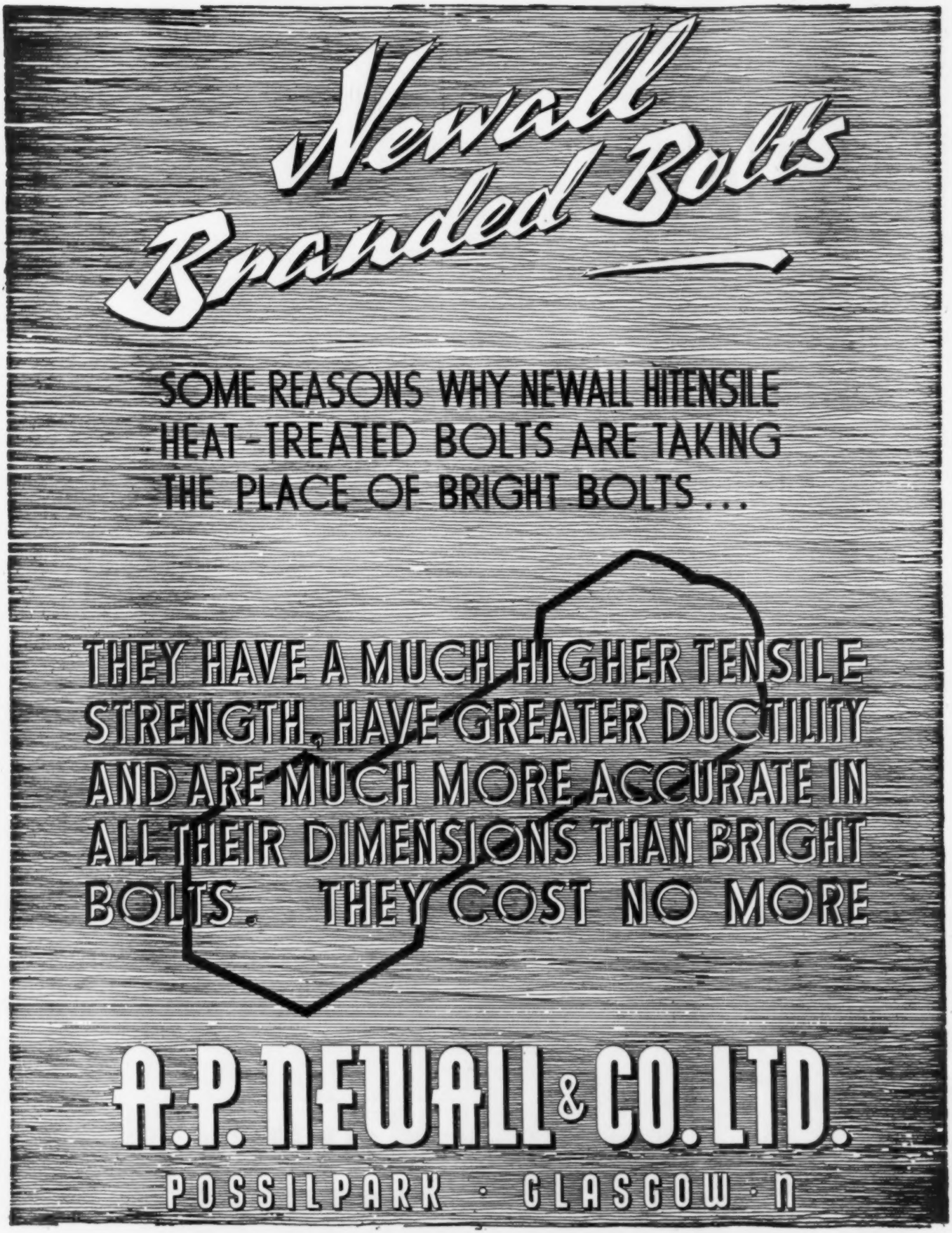
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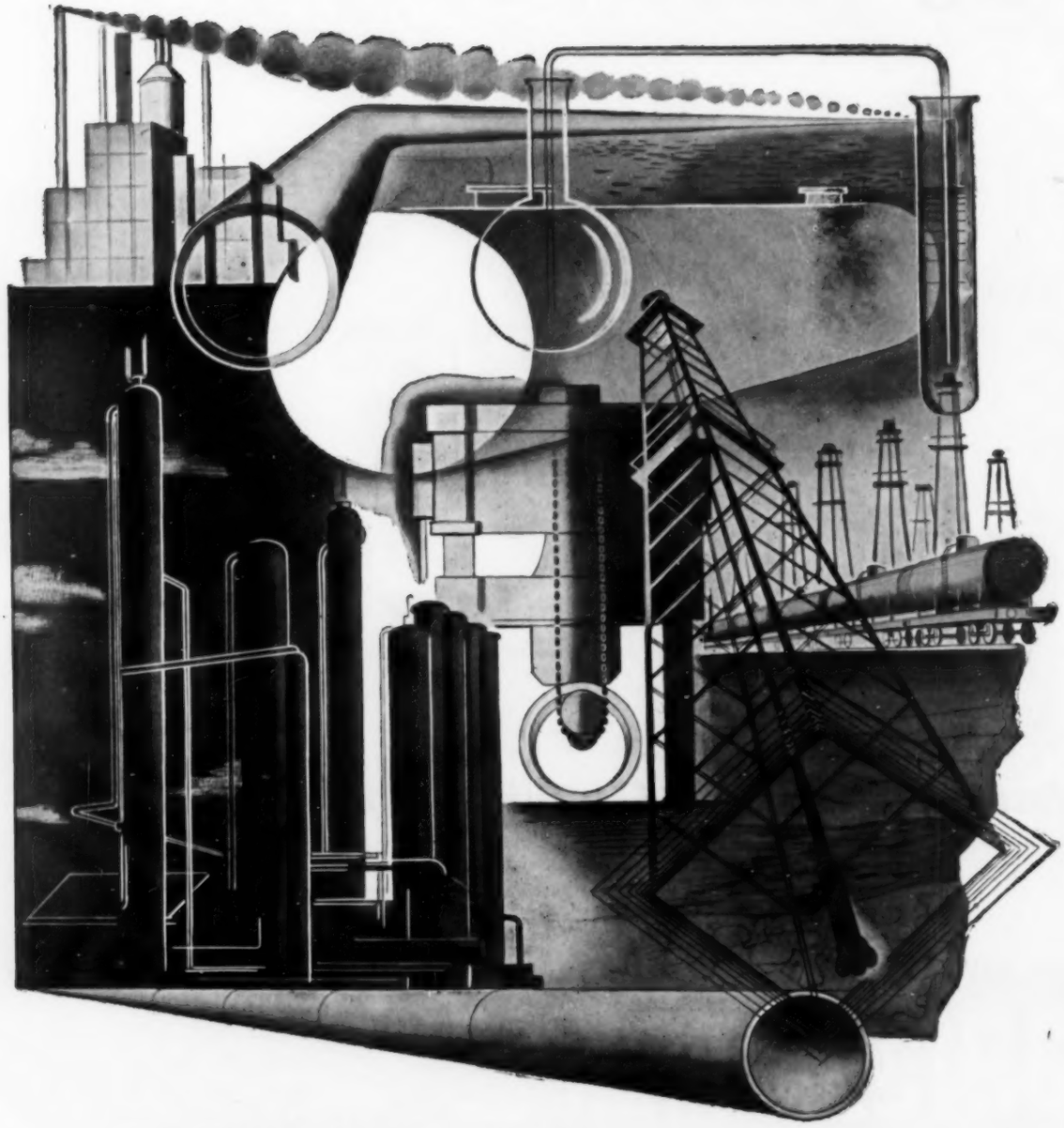

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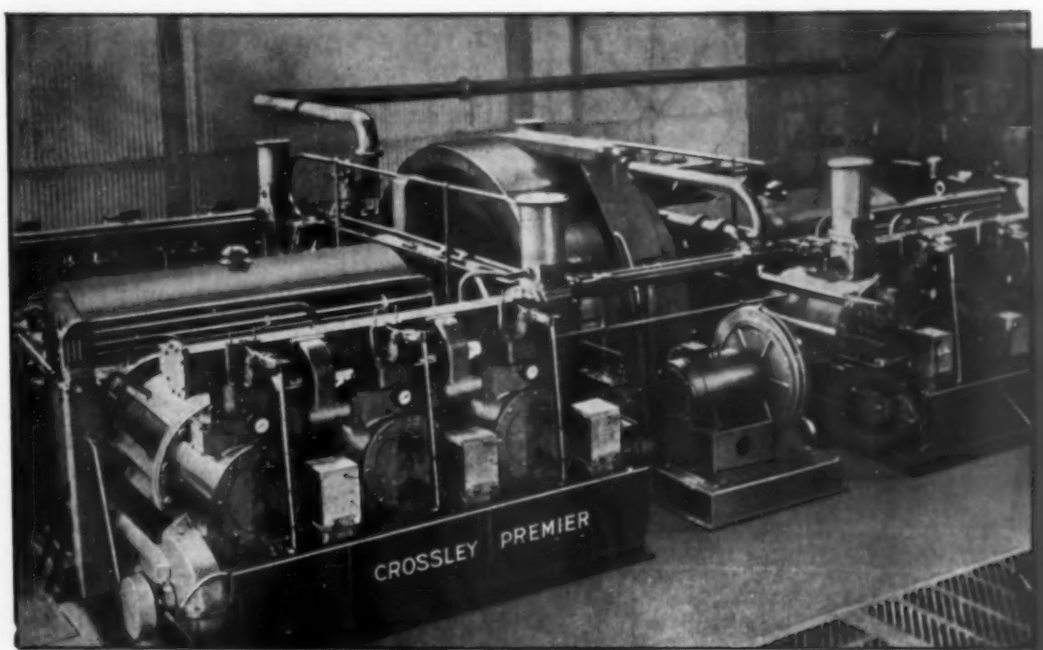

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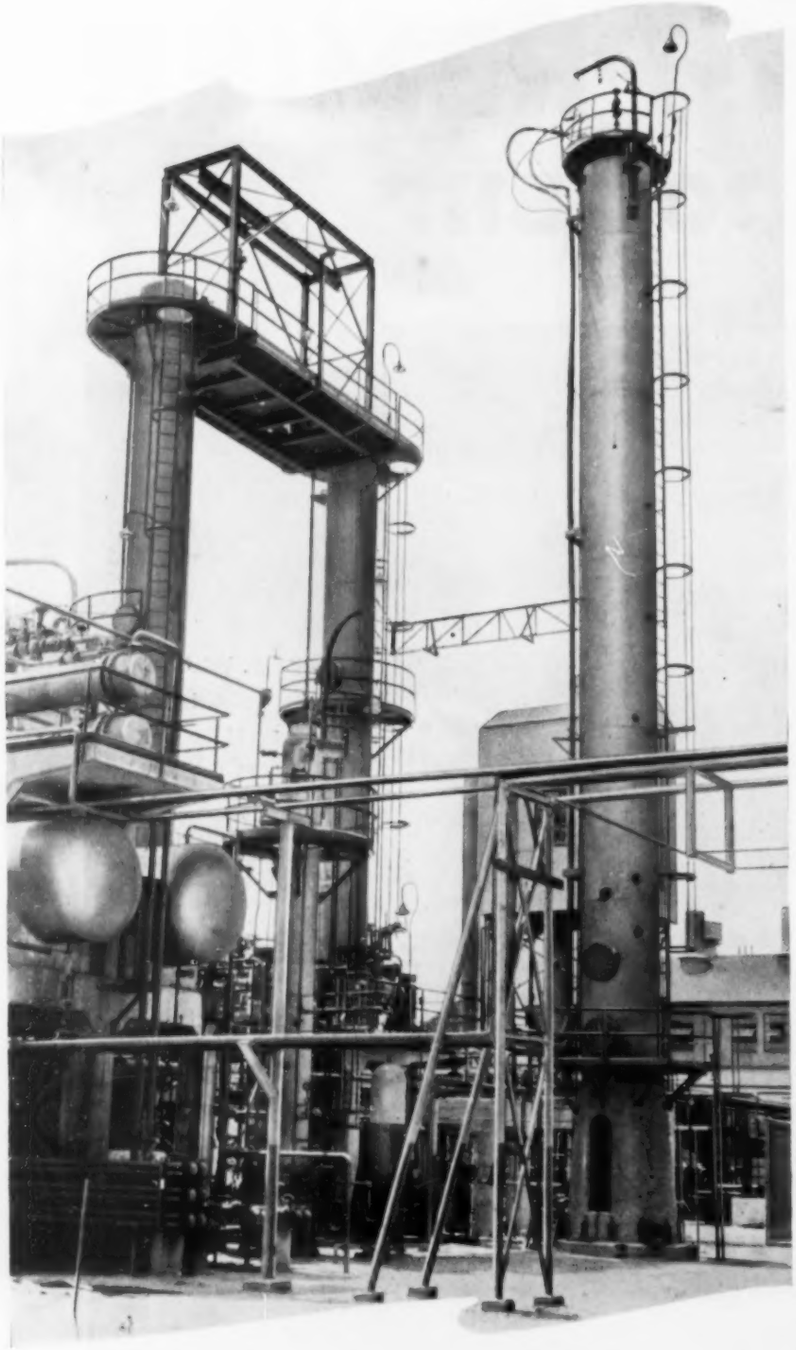

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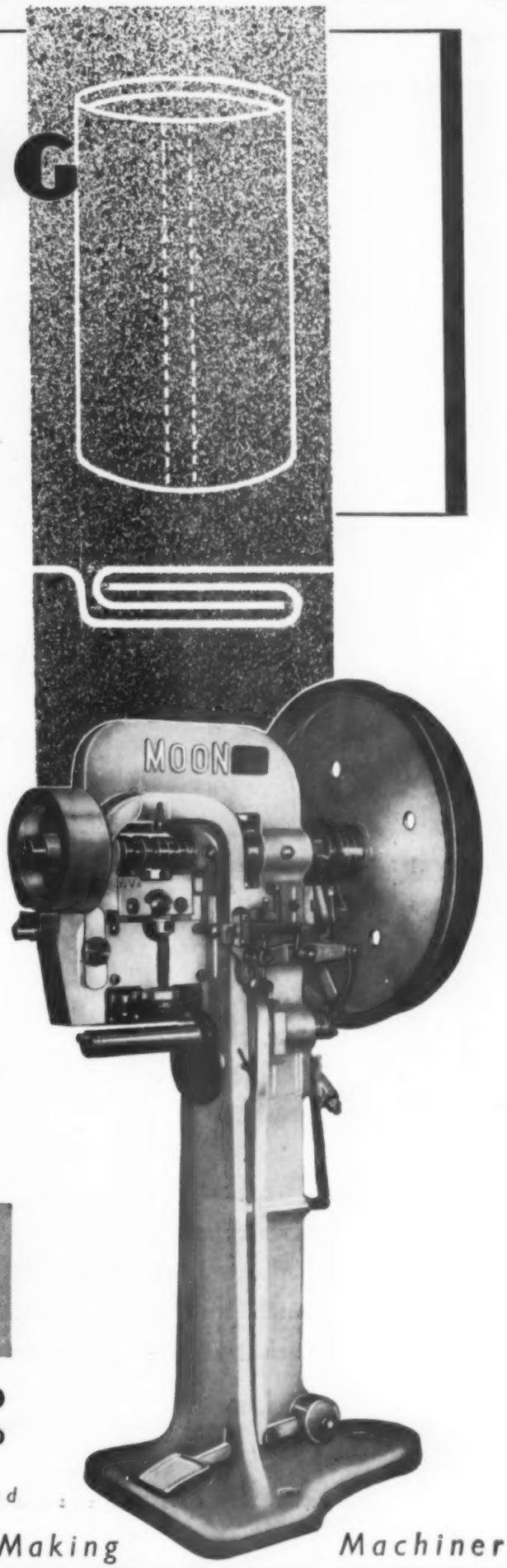

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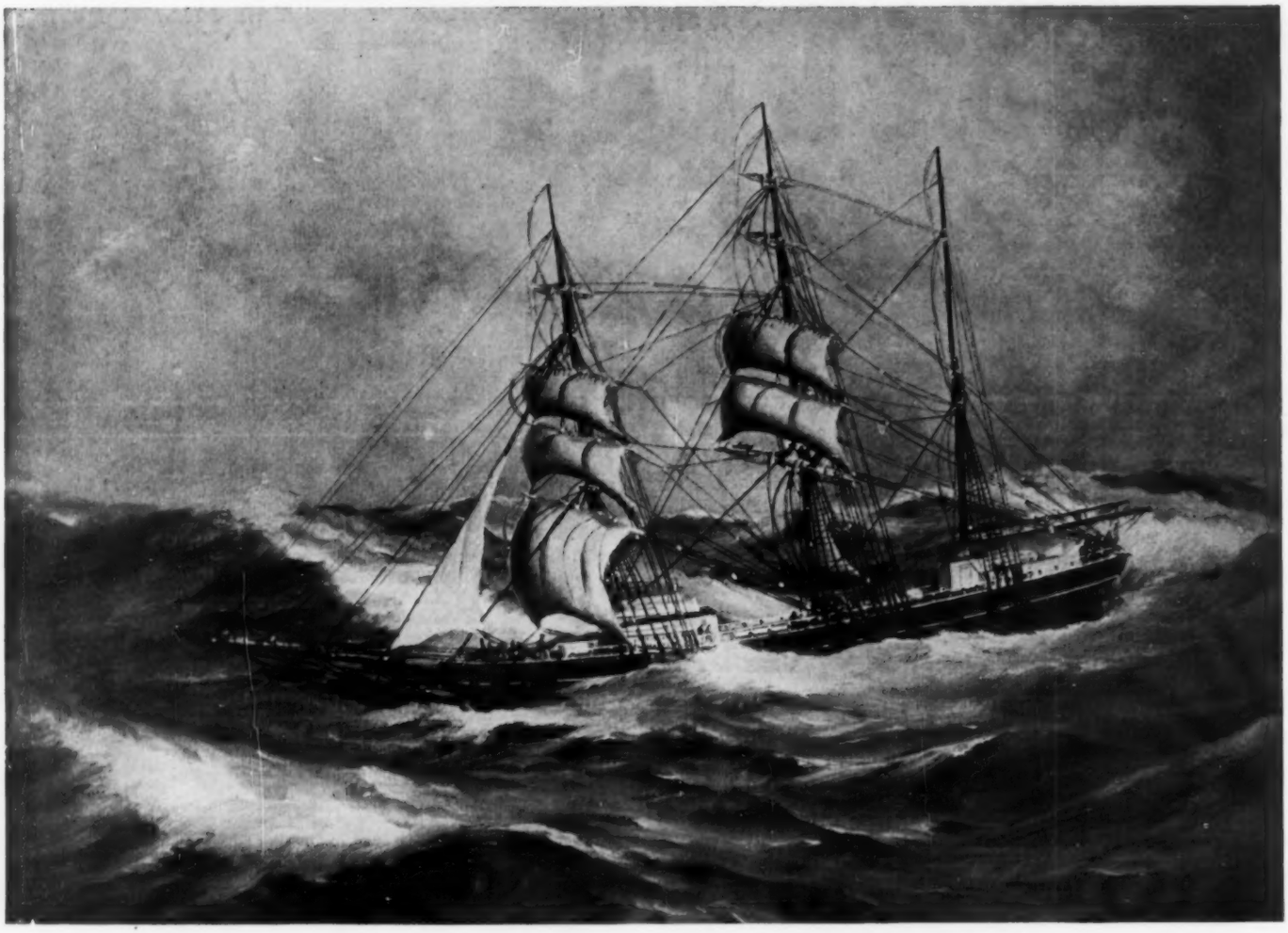

The Barque Georgietta, 459 tons, "running down her easting" in the Indian Ocean, en route to Australia from New York, in the "eighties", carrying case oil.

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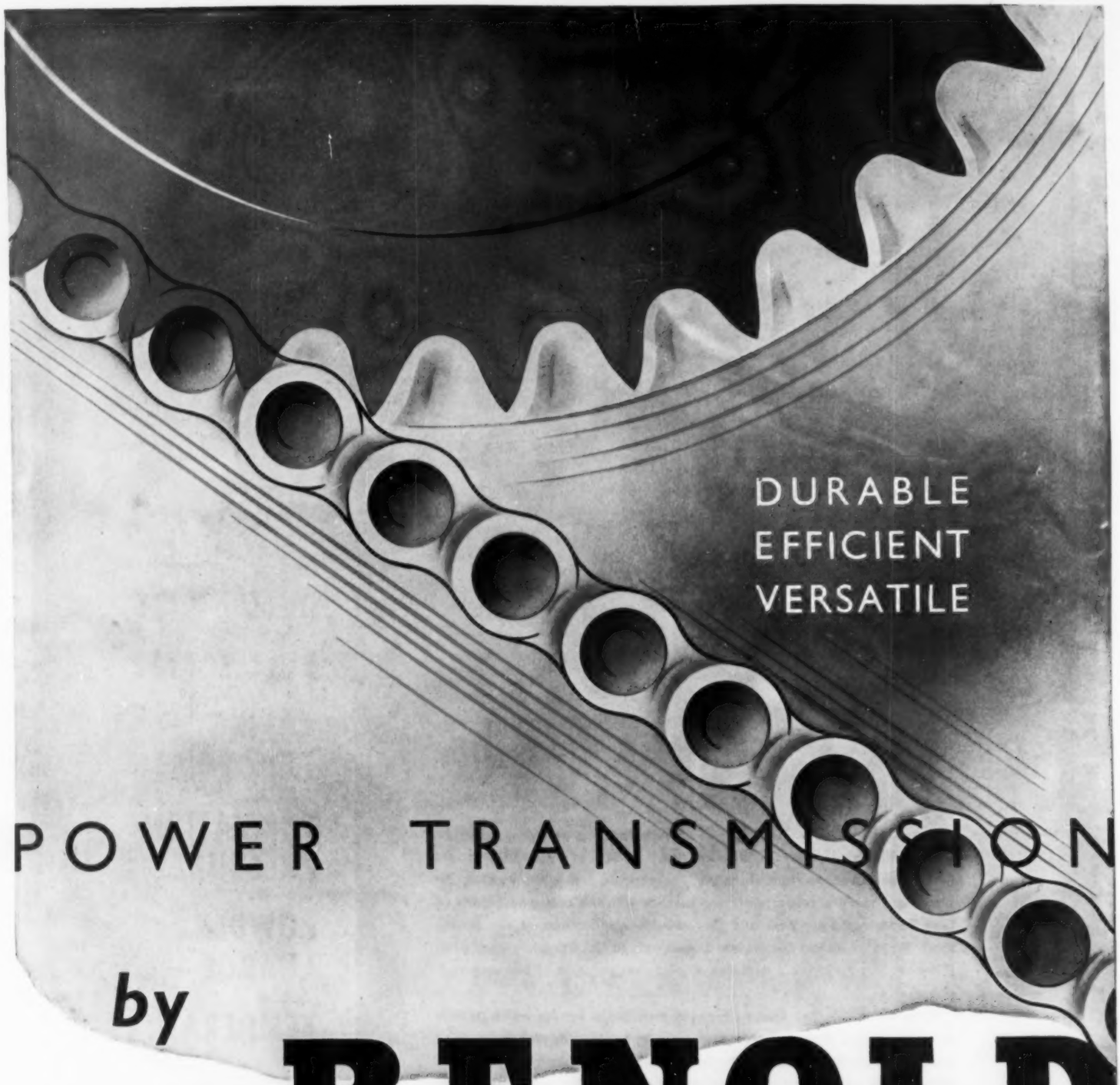

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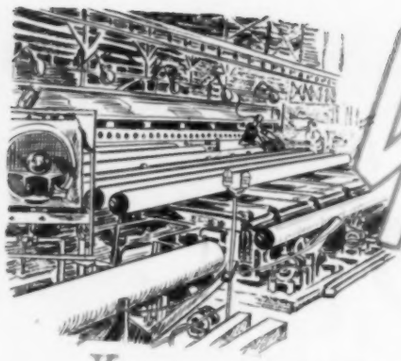

Youngstown to KANSAS

KANSAS has been an important oil and gas producing state for nearly half a century. In fact, it was the year Youngstown rolled its first oil country tubular goods--1903--that the Sunflower State first approached a million barrels of crude production.

In its all-time output of oil, Kansas ranks fifth among the states--fifth also in 1946 production. Proven reserves have fallen somewhat during recent years, but more wells are forecast for the future and footage to be drilled is on the increase. Kansas is not a deep well state, but the drilling trend is to lower horizons, with a new depth record of nearly 8,000 feet in Meade County in 1945.

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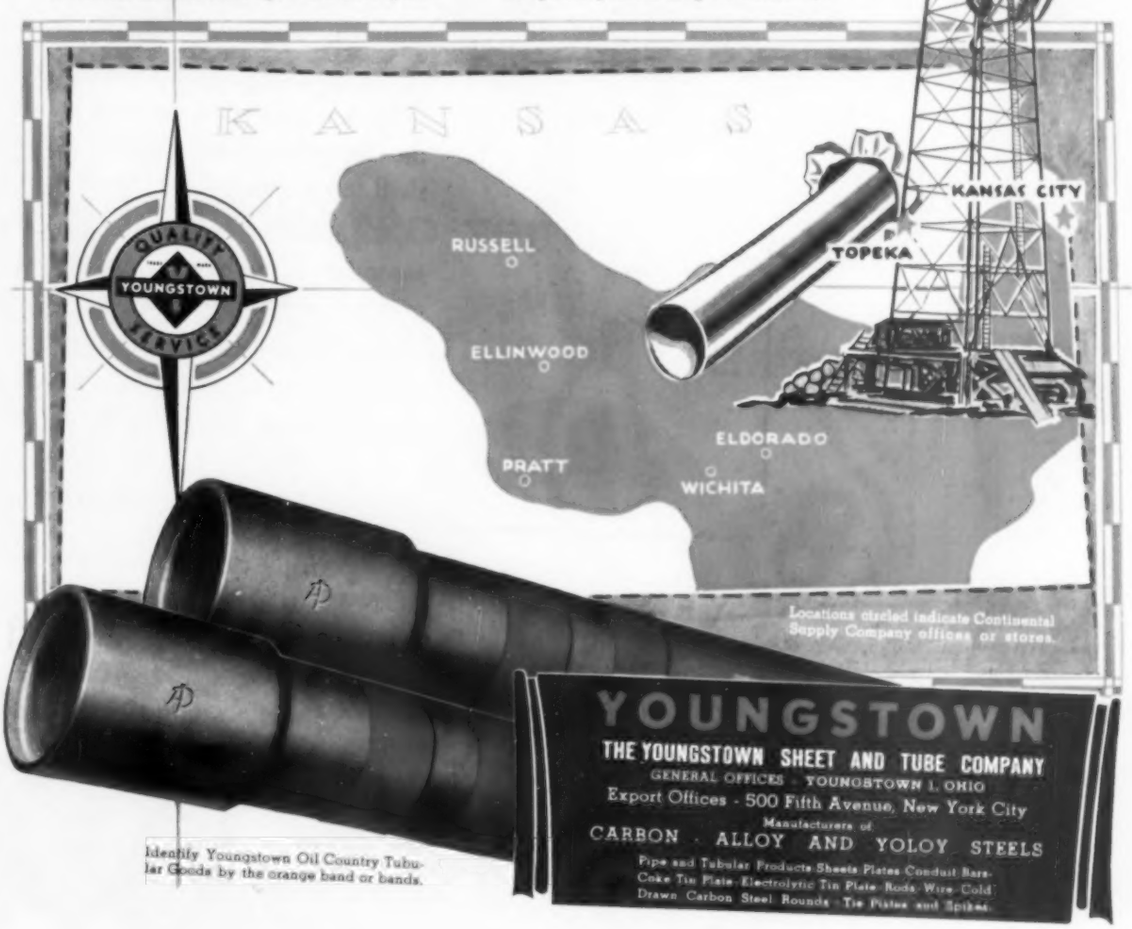

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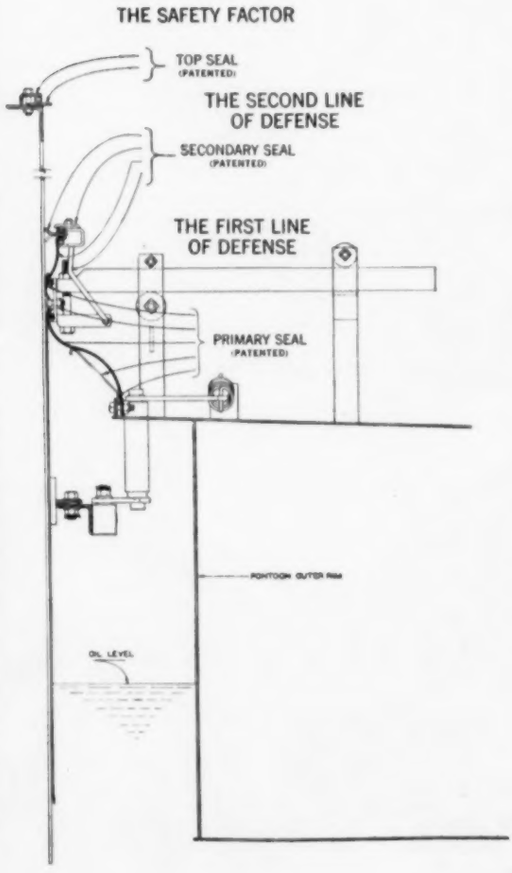

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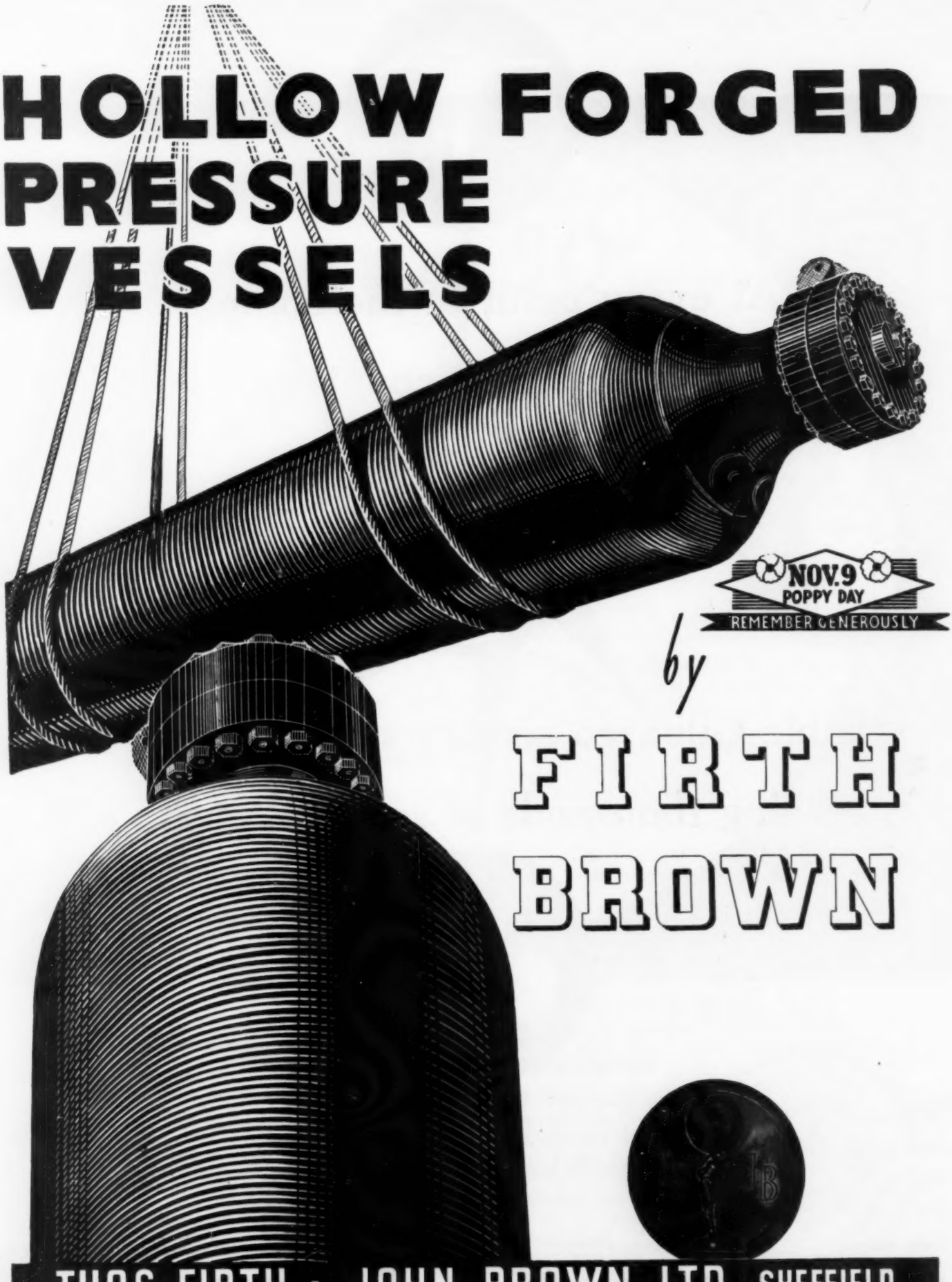

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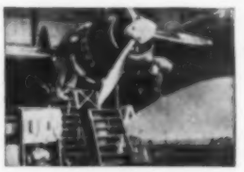

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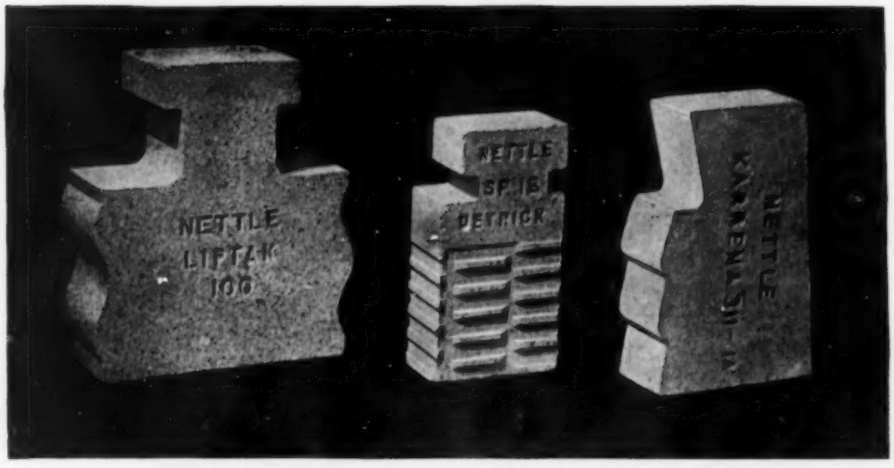

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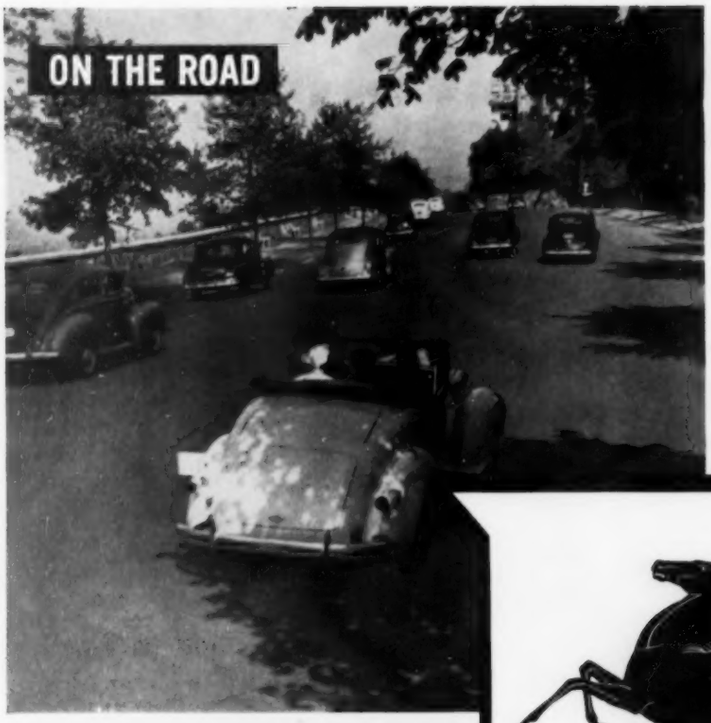

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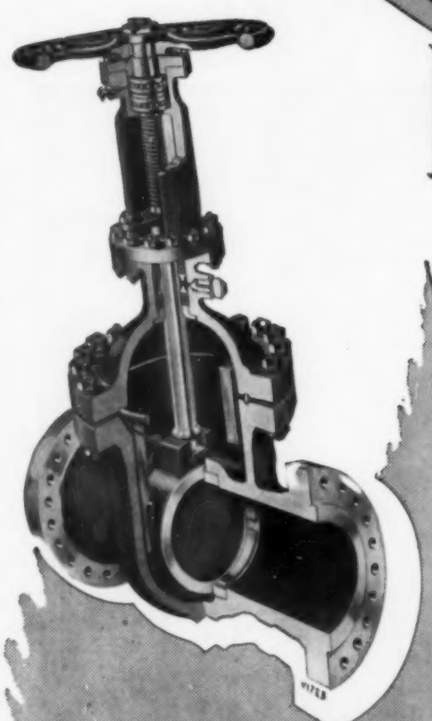

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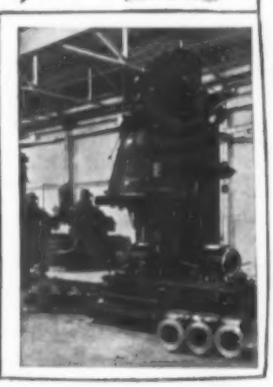

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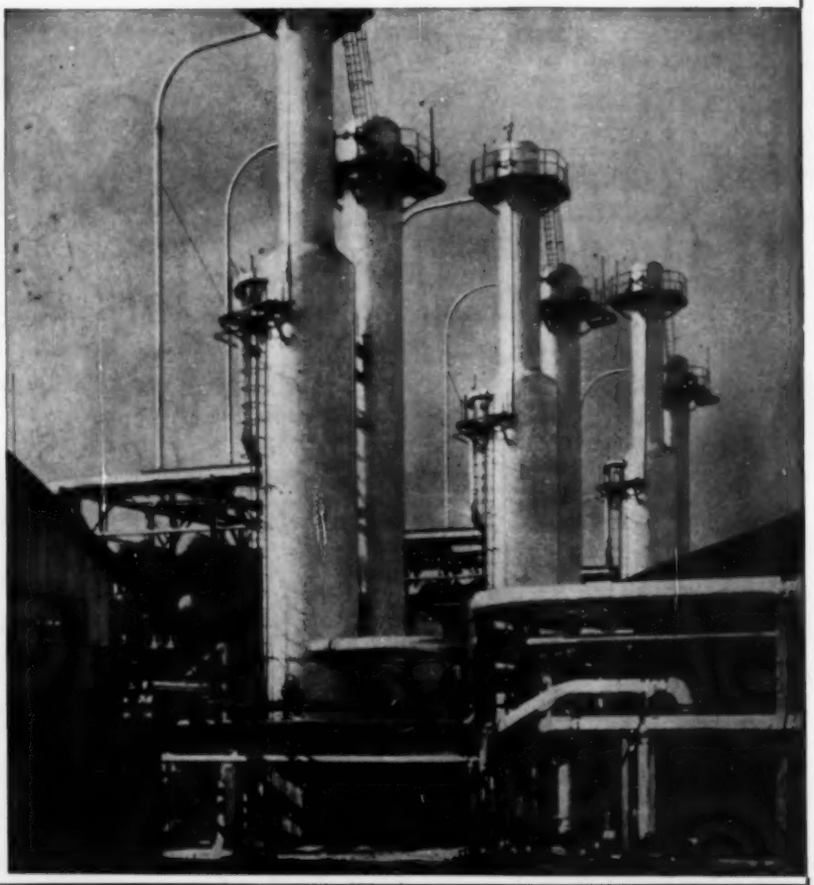

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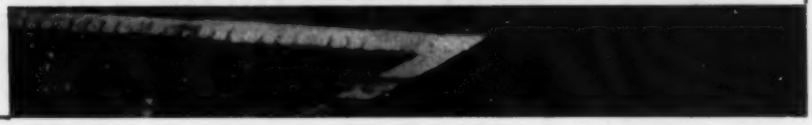

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PUBLISHED BY MONA PALMER

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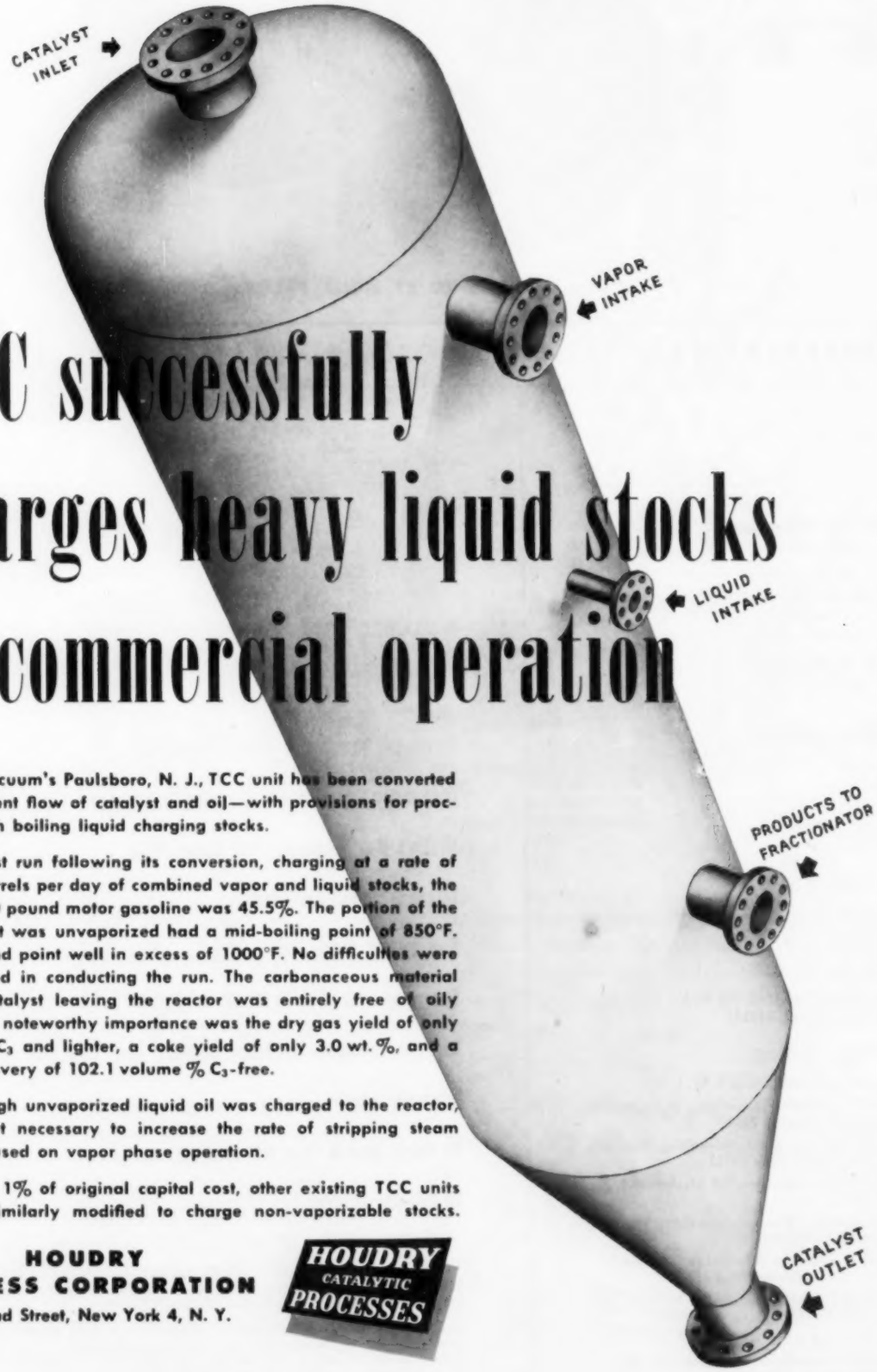
This Month's Cover: Pipeline walker inspecting Arabian American Oil Company's line in Saudi Arabia. Photo by Robert Yarnall Richie.

Last Month's Cover: Some copies of the December issue omitted the following data regarding the front cover: Imperial Oil Limited-Shell Oil Co. deep wildcat drilled to 13,747 feet in Alberta and later abandoned as non-commercial. Photo by A. Scovil Murray. Courtesy Imperial Oil Review.



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EDITORIAL

OIL INDUSTRY VIEWS FUTURE WITH CONFIDENCE

Entering 1947 the oil industry faces the future with hope and confidence. This is the prevailing sentiment that runs through the expressions of opinion from prominent members of the industry which appear on other pages of this issue. Backed by the remarkable record established during the first year of freedom from wartime responsibilities, there is every reason for encouraging assurance insofar as the industry can control its own destiny.

In the statements referred to, attention, naturally enough, is directed to the numerous particulars in which the operations of the past year have far exceeded the expectations formed at its beginning—the production of crude oil in greater volume than any previous year; an output of products 24 percent larger than in any prewar twelvemonth, rising in the case of distillates to 50 percent; refinements in operating practices and processes, yielding products of higher quality; development of new products as a result of greater attention to research; progress in conservation. The list could be extended much further; it all adds up to a year of advancement on many fronts.

Satisfactory as the progress has been and gratifying as are its results under the conditions that have prevailed, nobody realizes more keenly than oil men themselves that they are far from being at the end of their problems and that this is no time to rest on their oars. In a business as sharply competitive as petroleum, where the race is to him who is most energetic and progressive in providing ever better service to the public, it is questionable that such a time will ever come. Therefore, we find mention of the need for more exploration to maintain an ample backlog of known reserves in face of a constantly rising demand, of the importance of active research to find more effective ways of utilizing all the potentialities within each molecule of crude, of improving drilling methods and equipment in order to make it economically practicable to penetrate to greater depths in the search for oil, and of adjusting manufacturing facilities to meet the changing demands of consumers.

Looking forward, one question that is viewed with particular concern in certain quarters of the industry is that of the policy to be adopted regarding imports. Bearing directly upon this is the proposal of the State Department to begin, early in 1947, the negotiation of amended reciprocity agreements with eighteen nations, including several that are producers of oil for export. Crude oil brought into the United States from outside countries formerly was subject to a charge of 21 cents per barrel which was designated as an excise tax but was in effect an import duty. Under authority granted by Congress the President reduced the duties 50 percent. In the renewal of the act, the President again was empowered to make the same 50 percent reduction, and it is in the light of this authority that the proposed wholesale negotiations are to be undertaken. Should the full potential reduction be made, it would bring down to 5¼ cents the duty on crude oil with proportionate lowering of the charges against products. With a tariff of such nominal dimensions a substantial segment of the industry sees a possible inundation of the domestic market by low-cost oil produced abroad.

Among those who oppose the unlimited admission of foreign-produced oil, it is not proposed to prohibit imports. Advocates of restriction believe they should be limited to a specified small proportion of domestic output, but they recognize that certain official quarters in Washington harbor the belief that it would be good policy to depend increasingly upon imports and to reserve internal deposits for a possible future emergency, disregarding the inevitable consequence that if domestic activities were cut down the country would be incapable of meeting such an emergency. This question of imports undoubtedly will be the subject of increasing attention during the coming year.

On one point opinion within the industry appears to be thoroughly united. That is the vital importance of avoiding control of production and distribution either by bureaucratic agencies of its own government or by some international body subject to the views and theories of a group of governments. By nature and experience oil men are strong believers in freedom of initiative and management. They maintain that their ability to find oil and to convert it into useful products is greater than that of any politically directed board or agency. They point to the remarkable record of their industry in expanding production in pace with the rise in demand, in constantly improving and cheapening their products, and compare unfavorably with these achievements the results obtained where operation of the industry is in the hands of governments. As guardians of the citadel of free enterprise, no other group is more devoted than the members of the oil industry.

OIL INDUSTRY ENTERS YEAR OF EXPANDING ACTIVITY

AT its commencement 1946 was looked upon as a year of transition, a period of readjustment and concentration from the meeting of tremendous military requirements to the satisfaction of peacetime needs. It was agreed that with hostilities at an end, the consumption of liquid fuels by the Allied armies and navies, which by that time had dropped some 50 percent to 650,000 barrels daily, would undergo a further decline to 250,000 or 300,000 barrels daily with the demobilization of troops and the retirement of many vessels from active service.

Owing to the diversion of practically the entire facilities of the automotive industry to the manufacture of weapons of one sort or another for the preceding four years and the decrease in the number of motor vehicles in use, it was concluded, logically enough, that the demand for gasoline would undergo a sharp reduction. It was estimated that automobile production might provide four million new cars in 1946 but that gasoline consumption could hardly return to its wartime level before 1949 or 1950. With the end of lend lease which had absorbed 500 million barrels of American petroleum products during three years of conflict, it was inevitable that exports would fall off. While outside countries were in dire need of such products, neither facilities for transportation nor means of payment were available. The net conclusion of the estimators was that a crude production of 4,100,000 barrels daily in the United States would be sufficient to cover all domestic and export needs and that the wartime level would not again be reached before 1950.

Oddly enough none of these predictions have been confirmed by actual experience. Production at the beginning of the year was somewhat higher than it had been during the final four months of 1945, averaging 4,670,000 barrels daily during January-February, and was in excess of actual consumption. In March it was reduced to 4,414,000 barrels which proved inadequate to requirements, and from that point it was forced to rise in order to keep pace with demand. In June and July daily output exceeded the peak production of wartime, reaching a top figure of 4,990,000 barrels in the week of June 22.

During the latter half of the year production has run substantially above the corresponding period of 1945 with an indicated total output exceeding 1,730 million barrels as compared with 1,711 million for the twelve months preceding. Runs to stills have closely paralleled production, and stocks of crude at the end of the year are only three percent up from the end of 1945. Stocks of products have shown more variation and for fuel oil products are somewhat higher than at the close of the year preceding, but are still below the pre-war level of 1941, thus indicating that production has not been excessive as measured by rising consumption.

The high rate of gasoline consumption in 1946 is the more remarkable since it was established despite a disappointing record in the manufacture of motor vehicles. Most of the advance estimates assumed that something like four million private and commercial cars would be added to the total number in operation in the United States. Owing to protracted strikes and shortages of materials, the actual outturn has been little more than half that number. Passenger automobile registrations in 1946 were roundly 27,000,000 as compared with 25,691,000 in 1945 and 29,524,000 in 1941. Truck registrations at 5,423,000 are about 12 percent higher than in the last pre-war year.

Exports of crude petroleum from the United States during 1946 exceeded those of the preceding year by 20 percent while exports of products, though naturally lower than during the height of wartime activity, were still far above the average of the five-year period ending in 1941, the combined daily average of 433,000 barrels comparing with 300,000 in 1941. Imports likewise have surpassed those of any recent year with a daily average of 373,000 barrels as against 310,000 in 1945 and 260,000 in 1941. Imports have been made up roughly two-thirds of crude and one-third of products, the former being brought in mainly because of their suitability to the manufacture of heavy products and the bulk of the latter consisting of residual fuel oils. On balance the country has been a net exporter to the extent of some 23 million barrels or roughly 62,000 barrels daily.

Drilling activities maintained a high level during 1946 with a total of well completions exceeding 28,800, the largest number since 1941. Over 4,000 wildcats were drilled, of which some 700 were productive, 550 being oil wells.

The basic price of crude oil which had remained unchanged at $1.17 per barrel since 1941 under regulation by the Office of Price Administration despite sharp advances in wages and the cost of materials, advanced 35 cents per barrel during the early part of the year and a further rise of 10 cents became effective in November. While this increase scarcely balanced the upswing in costs, it substantially improved the situation of crude producers. Prices of products advanced in substantially the same proportion as the price of crude. Earnings have been restricted by the limitation imposed by prices under governmental control during the first part of the year which prevented them from rising in response to the increase in costs. The unexpectedly high demand for products, however, has led to a showing more satisfactory than was anticipated a year ago.

Such has been the record of the year just ended, a year in which the volume of business has exceeded all expectations and in which the industry has restored its full peacetime activities while carrying on its development work in exploration and drilling at a rate higher than it attained during the war period. It has been a year in which many obstacles have been encountered in the form of rapidly ascending costs, work stoppages, shortages of materials, and transportation difficulties, which have impeded progress but have not been able to stop it. What of the year now beginning, 1947? While there is a certain hazard in attempting to make forecasts, as has been shown by the experience of the past year and of many years previous, it is inherent in the nature of man to try to look ahead, and it is in fact a necessity for business, governments and individuals to form estimates of what lies before them in order to make plans and determine the course they are to follow.

In the United States calculations of the probable demand for crude and products to which special weight attaches are those prepared by the Division of Economics of the Bureau of Mines. One of the functions of the Bureau is to set up advance estimates from month to month of national requirements for the period immediately succeeding, and these carry such authority that they are accepted as a guide by state regulatory bodies in determining production allowables. Similarly the Bureau's statisticians at the end of each year compile tentative estimates of the country's requirements for the ensuing twelve months and the sources of supply from which these are likely to be met. Based on long experience and a careful survey of prevailing industrial conditions, these forecasts in the past have shown a high degree of accuracy. The Bureau's estimate of supply and demand for 1947 in comparison with the year just ended is given in detail in the accompanying table. They indicate a probable production of crude petroleum of 4,780,000 barrels daily in 1947 and of all oils of 5,100,000 barrels, an increase of nearly 62,000 barrels or roundly six percent. A gain of 4.3 percent in demand for petroleum products is estimated with small increases in all principal products. Imports are expected to continue at approximately the same

level as in 1946. In the case of exports a decline of 7.6 percent is anticipated. The main part of the estimated decrease is attributed to lower shipments of motor fuel, doubtless attributed to the expectation of a restoration of refining facilities in other parts of the world. Exports of crude and of products other than motor fuel are expected to show little change.

In its comment on conditions, the Bureau report says: "The total demand for all oils in the United States is the resultant of many variable factors at home and abroad. It is affected by the relative prices and supply of oil and other fuels, by progress in the production of motor vehicles and oil-burning equipment, and by the volume of industrial operations and world trade. Conditions in the post-war period are still so abnormal that any forecast can be only approximate and must be frequently revised as actual trends become apparent. Based on an analysis by products and the assumption of the continuation of a moderate decline in total exports, the forecast for 1947 represents an estimated increase of about four percent in total demand compared with 1946 and a gain of 26 percent compared with 1941.

"The estimate of the total supply of all oils involves the ability to produce crude oil, the upward trend in the production of natural gasoline and condensate, the conditions of world supply as reflected in probable imports, and probable changes in the stocks of refined products. It has been assumed that if imports continue at the same rate as in 1946, crude production will exceed the record of that year by about one percent. If demand should exceed the amount forecast, either required production would be greater or imports larger.

"Stocks of refined oils were abnormally low at the end of 1945 and a substantial increase was indicated in 1946. However, the gain of about 45 million barrels during the year was abnormal and resulted from the high runs to stills in the second and third quarters and the unexpected reductions in fuel-oil consumption due to industrial shutdowns, reduced military purchases, and mild fall weather. Crude runs to stills reached a peak of 4,860,000 barrels daily in the third quarter and dropped to an estimated level of about 4,730,000 barrels daily in the fourth quarter as the result of the increase in refined inventories. It is estimated that distillate fuel-oil stocks increased about 22 million barrels during the year, residual fuel-oil stocks gained about 13 million barrels, kerosene stocks rose about six million barrels, and finished gasoline stocks declined about two million barrels.

"The analysis of the stock situation indicates that the consumption of crude oil in 1946 was possibly 1½ percent greater than required and at least covered by any normal increases for both 1946 and 1947. In considering the readjustment of this stock situation in 1947, it does not seem feasible to reduce runs to so low a level in the first quarter as to require operations that might strain refinery capacity in the latter half of the year, particularly if total demand should exceed present estimates. The forecast of crude runs of 4,700,000 barrels daily in the first quarter of 1947 is predicated on an adjustment of product yields to produce a maximum normal seasonal increase in gasoline stocks and a maximum decrease in fuel-oil and kerosene stocks. In considering the stock situation, it should be noted that, as stocks in military custody are depleted, the stocks in company custody, as reported to the Bureau of Mines, must service a larger part of the demand."

Supply and Demand All Oils 1946-1947 (Millions of barrels)

	1946			1947—Forecast			
	9-Month Actual	Last Quarter Estimated	Total Year Estimated	First Quarter	Second Quarter	Last Half	Total Year
Production							
Crude	1,293.9	437.0	1,730.9	423.0	435.0	888.0	1,746.0
Other Oils	86.2	29.3	115.5	29.5	30.0	63.5	123.0
Imports							
Crude	65.2	22.0	87.2	21.5	22.0	45.5	89.0
Refined oils	35.7	12.4	48.1	11.0	11.0	24.0	46.0
Change Stocks	+52.0	+2.7	+54.7	— 3.0	+ 4.0	— 7.0	— 6.0
Crude	+ 4.5	+3.3	+ 7.8	+ 4.0	— 0.5	— 3.5	.0
Natural Gasoline	+ 2.8	—0.6	+ 2.2	0	0	+ 0.5	+ 0.5
Refined oils	+44.7	—	+44.7	— 7.0	+ 4.5	— 4.0	— 6.5
Total Demand	1,429.0	498.0	1,927.0	488.0	494.0	1,028.0	2,010.0
Motor Fuel	581.5	192.1	773.6	171.0	211.0	423.0	805.0
Residual Gasoline	358.3	126.1	484.4	127.0	117.5	245.5	490.0
Distillate Fuel	195.3	73.6	268.9	86.5	62.5	141.0	290.0
Kerosene	68.4	28.0	96.4	32.5	21.0	47.5	101.0
All Other	225.5	78.2	303.7	71.0	82.0	171.0	324.0
Exports	119.1	39.0	158.1	36.5	38.5	71.5	146.5
Crude	30.0	9.5	39.5	7.5	10.5	21.5	39.5
Motor Fuel	35.5	10.5	46.0	10.0	9.0	17.0	36.0
Residual Fuel	7.1	2.8	9.9	3.0	2.5	4.5	10.0
Distillate Fuel	26.0	9.0	35.0	9.0	9.0	15.0	33.0
Kerosene	7.1	2.9	10.0	2.5	2.5	4.0	9.0
All Other	13.4	4.3	17.7	4.5	5.0	9.5	19.0
Crude Oil Run to Stills	1,294.7	435.3	1,730.0	423.0	436.8	894.2	1,754.0

MUCH CONSTRUCTION WORK NEEDED

By K. S. ADAMS
President, Phillips Petroleum Company

As we draw to the end of 1946, we find the petroleum industry in a very healthy condition. The peacetime demand in 1946 was almost equal to demand of 1945, when the country was at war, and was 20 percent over that of 1941, the last prewar year. Indications are that the demand for 1947 will top all previous records if our national business activity does not deteriorate because of labor troubles.

Although during the year the industry received moderate increases for crude oil and its products, these are not yet sufficient to expand crude oil discoveries in this country proportionately to the increased demand. Every year the industry has to drill deeper and go farther afield to find new oil pools. With the resulting additional costs, further increases in prices will be necessary.

During the war, the industry concentrated on enlarging its production of materials necessary for the prosecution of the war, such as high octane aviation gasoline, synthetic rubber and so forth. With the greatly increased overall demand, some departments of the industry, and in particular crude oil and gas pipe line transportation, are very much behind. Therefore, there will be a very large amount of construction in the next few years.

Besides low prices, the other big problem in the industry is the uncertainty of labor conditions. The oil industry pays the highest wages of any industry in the country for comparable work, and has probably been freer from labor troubles than most industries. However, it has been sufficient to give management considerable concern.

An even greater growth and development has taken place in the gas industry during 1946 than in the oil industry. A large expansion of gas pipe line capacity to consuming centers has been approved by the Federal Power Commission and is being planned or built. Better and cheaper methods of converting gas into motor fuel also have been developed, and plants for this purpose are also being built.

With the ever-increasing demand for petroleum and its products, the outlook for the industry on an expanding scale seems assured for many years.

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OIL INDUSTRY'S CONTINUING PROGRESS

By WILLIAM R. BOYD, Jr.
President, American Petroleum Institute

The American Petroleum industry concludes the eventful year of 1946 with the greatest production of crude oil in its 87-year history, with ample reserves to meet all demands for liquid fuels and lubricants in the foreseeable future and with plentiful stocks of gasoline and heating oils for the winter season.

Outstanding in the closing year has been the unprecedented demand for petroleum products. After V-J-Day it was generally assumed that demand would fall off as a result of the lessened military requirements and the decline in the number of motor vehicles in service. Instead demand has grown, and estimates for the future, when motorcar and truck production gets into full stride, are being revised upward.

This first full peacetime year also has brought with it an increased realization of the importance of natural gas as a great natural resource, not only for the supply of heat and energy, but as a source from which liquid fuels, lubricants, and other products presently made from crude oil can be manufactured. Proved natural-gas reserves of the nation now are estimated at more than 144 trillion cubic feet, and are still growing. At present consumption rates, this represents at least a 30-year addition to our proved petroleum supply.

The pessimistic view that crude-oil discoveries of importance are on the decline in this country has, in my opinion, little basis in fact. New discoveries in South Texas, for example, are giving rise to considerable speculation that this area may prove to be an oil reservoir of vast extent, and the same is true of new strikes along the Gulf Coast of Mississippi.

The Rocky Mountain area is another case in point. The first oil wells drilled in the United States, outside of Pennsylvania, were drilled in Colorado in 1862, and oil has been produced commercially in the Rocky Mountain states since 1876. Nevertheless, prior to World War II, the oil industry in the Rockies never flourished to the extent that it did in other areas. The difficulties of mountain drilling, the distances to markets and the scattered local population have been contributing factors.

With the advent of the war, however, the Rockies came to life, and they bid to remain so henceforward. This is exemplified by the fact that daily average production there in 1940 was 94,000 barrels, and in 1946 was more than 150,000 barrels. New and important discoveries have been made last year and this. The potential output of this great region is not known to us now but it is certain to become one of the nation's large oil-producing areas.

Add to this the potential production of the Continental Shelf, methods of drilling offshore that have been in use for a number of years, and it is readily apparent that the United States is in no danger of running out of oil or gas for many years to come. When the day of scarcity arrives, coal and oil shales will be utilized to make whatever liquid fuels the nation requires.

Equally important as new discoveries in extending the nation's oil reserves are new methods of production and new methods of utilization. Not so many years ago a recovery of 20 percent of the oil in a given field was not unusual. Today, by modern methods of conservation and production practice, a recovery of 80 percent is expected.

Thus the continuing research of the country's oil production has quadrupled our reserves in existing reservoirs.

Research, too, is providing increasing efficiency in the use of petroleum products. An example of this is the fact that the passenger-car consumption of lubricants dropped from 3.59 barrels per 100 barrels of motor fuel in 1930 to 2.04 barrels in 1941. When later figures are compiled they undoubtedly will show a continuing drop.

The automotive engine is far from perfected. Both the engine designers and the designers of fuels are well aware of that. Continuing research, however, much of it carried on jointly by the two industries, regularly improves motor efficiency and again adds to the nation's oil supply.

The petroleum industry faces the coming year with confidence in its leadership, faith in its skills, and pride in its workmanship. It stands ready, as it has in the past, to render greater service to the American people.

EXPANSION REQUIRED IN ALL BRANCHES

By W. T. HOLLIDAY
President, Standard Oil Co. (Ohio)

A continued high level of demand for the products of the petroleum industry is indicated in the coming year. Although the new car output of the automotive industry during 1946 was adversely affected by labor difficulties and material shortages, there is no evidence that the total consumption of gasoline has suffered as a result. The automobile population of the country has been maintained, and if production in 1947 reaches the current forecasts, the probability of a shrinkage in the number of cars on the road should diminish. Also, a continuation of the annual rate of consumption per car is indicated by the outlook for national income and the increasing leisure time of car owners.

Increasing demands for petroleum products by other than automotive users are developing from the high rate of industrial activity, further mechanization of farm equipment and a stronger competitive position in the heating of homes and commercial buildings. All of these factors point to a considerable period of growth ahead which will require planning of an expansion program in all branches of the industry's activities. Having so recently passed through the expansion necessitated by wartime requirements, the industry has a strong base for its further building.

Current pressures which are forcing costs upward present a problem requiring close management attention. With costs held in line, the competitive factors of both price and quality of product which have contributed so much to the strength of the industry should continue to assure its important position in the nation's economy.

NEW YEAR SHOULD BETTER 1946 RECORD

By J. HOWARD PEW
President, Sun Oil Company

Functioning under its greatest freedom from government control since 1941, the American oil industry in 1946 produced a greater volume of crude oil and petroleum products than in any war year, and exceeded the highest pre-war peak by more than 24 percent.

The remarkable record of production would have been impossible except for the absence of any serious labor difficulty anywhere in the oil industry. Oil industry employees accepted the challenge of maximum production to help stabilize our economy in this inflationary period, and met the challenge with old-fashioned hard work.

Accounting also for the record output was the oil industry's large, privately-financed investment in plants and other equipment during the war. The continuing development of management "know-how" in the operation of these new processes enabled the industry to use them last year with increased efficiency and at higher capacities.

In a year when thousands of returning veterans were being refitted into oil company organizations, and when costly and time-consuming readjustments from a single-minded purpose of war presented many challenges to management and worker alike, the oil industry's exceptional performance is proof of its resourcefulness and flexibility.

The industry's products, highest in quality it has ever achieved, have been abundantly available for all at costs which are at the bottom of the commodity price index. A gasoline dollar, excluding tax, in 1946 bought 48 percent more than the food dollar, 50 percent more than the clothing dollar and 30 percent more than a dollar spent for all consumer items. At the same time, the industry's wages to employees were among the highest paid by any industry.

Production of crude oil and principal petroleum products averaged approximately 5,075,000 barrels daily in 1946, compared with a peak wartime production in 1944 of 4,864,300 barrels daily and a pre-war peak production in 1941 of 4,072,700 barrels daily.

The industry's production of gas, oil and distillate fuels, the components containing home-heating oils, was more than 50 percent above the highest pre-war year. Production of kerosene was up more than 45 percent, residual fuel oil 28 percent, lubricating oils nearly 13 percent and other products 42 percent.

Motor fuel production was four percent higher than the peak war year, and 9.4 percent above the peak pre-war year.

The oil industry enters 1947 in a sound condition. Proved crude oil reserves have continued to increase and are now at the highest level in the industry's history. The industry's technology is far advanced, and research by the industry is being conducted on a vastly expanded scale.

Barring serious work stoppages in 1947, every indication points to an expectation that the oil industry in the coming year will substantially exceed the record of 1946.

FREE ENTERPRISE AT STAKE

By REESE H. TAYLOR
President, Union Oil Co.

Oil industry prospects for the coming year are dependent upon a solution to the problems that currently are facing our system of free enterprise.

The year has a chance to be a good one. People are buying automobiles when they can get them. Oil is receiving wide acceptance for home heating. Diesel locomotives are in demand. Revolutionary developments in greases and lubricants are opening new markets. Better gasolines are available when the government will let us sell them. These conditions should place the oil industry in a very favorable position in regard to the coming year.

Success of an industry, however, is based upon markets, production and spirited competition for those markets. The oil industry certainly is competitive and its production is without parallel in the world. But our markets are based on the productivity of many other industries. We can't sell oil to people who have no houses in which to put an oil burner. We can't fill automobile tanks when they are held up on the production line by strikes, no matter where the shutdown originates, and we can't sell much lubricant and grease to any industrial establishment that is slowed down or halted.

It is my hope and belief that 1947 should see this country returning to the system of free competitive enterprise and free collective bargaining that has made America great. The only wealth that can maintain and raise our standards of living is the wealth of production and competition is the spur to production. A healthy economy must be based upon the realization by each individual working man that to earn more he must produce more. If during the coming year we do return to these principles, the industry should do well.

OIL INDUSTRY'S HOUSE IN ORDER

By W. S. HALLANAN
President, Plymouth Oil Company

The oil industry faces the New Year with its house in order.

We are fully conscious that the problems of peace are no less serious and compelling than were those of war, but we find a large measure of satisfaction in the knowledge that the industry is prepared to meet any new obligation and responsibility which changing conditions may impose.

It is our job, through new discoveries, to maintain our reserve ratio; through the genius and skill of technicians, to continue to improve the quality of petroleum products and to develop new uses for them; through increased efficiency, to assure the maintenance of reasonable prices; and, through a faith in America and its institutions, to strengthen the national determination to go ahead in the American way in the exploration and development of new economic and social frontiers.

The oil industry is extremely sensitive to every economic disturbance in other lines of business, with the consequences that its outlook for the coming year depends in great measure upon the ability of the nation to solve those problems which have caused paralysis in many lines of industry since V-J Day. If, through the actions of the new Congress and through the forward-looking, common-sense efforts of management and the responsible leaders of labor, the great productive energies of the country can be unshackled, there is every prospect that in 1947 there will be laid the foundation for an era of great prosperity. Such an era will impose new record peace-time demands upon the oil industry. As the result of years of preparation and constantly-improving efficiency, it is prepared to meet those demands. I am confident that it will maintain its unparalleled record of meeting and solving every new problem and discharging every new obligation.

AVOID IMPORT INUNDATION

By RALPH T. ZOOK
Former President, IPAA

I would suggest that a permanent "time out" now be called on those defeatists who mathematically determine the United States must depend on imports for its future supply of petroleum.

The price of crude oil was frozen at an inadequate level by the Office of of Price Administration. The industry has been short of manpower and materials for five years. Yet it has mainly fueled the greatest war in history and still has more proved reserves than at any time since oil was discovered.

A sufficient price for oil does not mean excessive cost of products to the consumer. The average price of gasoline (ex taxes) paid by the public at the filling station has been reduced from 21 cents per gallon in 1926 to 15½ cents in October, 1946. At the same time quality has been greatly improved.

Greater reserves and producing capacity are needed in the light of increased demand and possible emergency requirements. To accomplish this the domestic oil industry needs adequate price, materials, and manpower. Confidence must be established through collaboration by government and industry in the development of a specific long-term import policy on petroleum and products that will allay fears of domestic producers.

Such a program would encourage the development of improved technique in finding and producing petroleum and its products. It would further the production of petroleum and products from natural gas, shale, and coal. It would bring about the maximum crude oil reserves and producing capacity of which this nation is capable. These developments would supply this nation's requirements at fair prices from within its own borders for hundreds of years.

The use of the word "would" in the preceding paragraph is deliberate. It will only come about if the industry and the nation become alive to the dangerous proposals on oil by those who are uninformed or who would stifle the development of adequate domestic reserves by using this country as a dumping ground for large amounts of foreign petroleum and products.

EXPANDED EXPLORATION IN MOUNTAIN REGIONS

By JAMES DONOGHUE
President, Rocky Mountain Oil-Gas Assoc.

Here in the Rocky Mountain region we look forward to an extensive exploration program in 1947. The degree of success that will attend it naturally will depend upon the availability of the necessary pipe and other materials. The oil industry is ready to go if it can get the tools.

Nationally the question of imports is one of concern to our producers. We feel that imports should be kept within reasonable limits. In other words keep imports on the basis of a check and balance to permit an orderly expansion of the domestic industry.

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1947 WILL BE BANNER YEAR — "IF"

By B. L. MAJEWSKI
Vice-President for Marketing
American Petroleum Institute

If America settles down to work in 1947, it will be a banner year for the sale of petroleum products. It is not pleasant to emphasize that "if," but a realistic view of the situation requires it.

The two great pentup needs of the nation today are housing and transportation. Oil is intimately concerned with both. If large-scale home building gets under way in 1947, the demand for domestic heating oil, in my opinion, will top all of our expectations. Similarly, if the production of motor cars and trucks reaches the goals of the motor makers, the sale of gasoline and lubricants will set an all-time record.

I am confident that the American industrial machine, which has coughed, sputtered and limped through much of 1946, will get to rolling in the months ahead. All the signs seem to point that way. If they do, 1947 will be the busiest of years for petroleum marketers. Petroleum marketing today, however, is not confined to the distribution of gasoline, fuel oil and lubricants. A modern refinery is the source of literally thousands of new products and in these by-product fields the outlook is highly encouraging.

The use of liquefied petroleum gases, for example, is constantly growing. Farmers and rural residents not connected with gas mains are finding butane and propane gases a cheap, convenient and efficient source of fuel. In fact, the farm market generally is increasing by leaps and bounds. It has been estimated that about $35,000 worth of mechanical equipment is needed to operate a highly cultivated farm of from 250 to 400 acres by modern farming methods. More and more farmers are turning to scientific, mechanized agriculture and that means more customers for the products of petroleum.

I should like to see particular attention paid to lubrication in 1947, and in all the other years ahead as well. The United States is a machine nation and machines require proper lubrication. Not one in ten gets it. That applies to farm machinery, stationary engines and a host of other things as well as motor cars. It is our duty as an industry to keep harping on this subject of proper lubrication. It's part of our service to the public. It is sound marketing practice, of course, to sell our merchandise wherever possible, but this question of lubrication transcends that. Lubrication is important for the proper functioning of any machine and lubrication is our business.

Competition is responsible for the growth of our industry and clean, aggressive competition will send it to new heights in the year ahead. The public opinion survey recently conducted for the Institute revealed that the public ranks the filling station first in service of all retail stores. It is our prime duty to maintain that record.

OIL FACES BEST OUTLOOK IN ITS HISTORY

By ERNEST O. THOMPSON
Railroad Commissioner of Texas

The year 1947 should be one of the best years of the oil producing industry's eventful history.

My reasons for this forecast of continued prosperity in the oil producing business is that a continued strong demand is, in my opinion, assured by more automotive units coming into use and will shortly reach an all-time high in the number of automobiles and trucks in use. Tires are being made in large numbers and a cut in tire prices is in sight. Pent up desire for a long automobile vacation trip will find realization this coming year by millions of our people with their new cars and new tires on their old cars, and a greatly increased use of Diesel motive power by the rails and enormous increase in oil burner heating units is a certainty. The coal strike has given a great impetus to the oil heating business. All who can will convert to oil or gas.

Better conservation measures are constantly being established and better prices are necessary to support the steadily mounting drilling costs of deeper and deeper wells to get the required oil.

A better field price for natural gas due to more gas pipe line construction and the conversion of the Big and Little Inch Lines to gas will enable us to forbid the flaring of casinghead gas produced with oil from oil wells.

In the past the market price of flare gas was so low that it would have approached confiscation to have required the reinjection of all flare gas from oil wells.

Now with a better market flare gas has increased in price to a present value of five cents a thousand. Therefore it is worth saving and in my opinion we can legally compel its full conservation and utilization.

Stocks of crude oil and gasoline and other products have now been brought up to proper working levels.

The producers and the regulatory authorities of the oil producing states realize fully that drastic cuts in production are needed to avoid unnecessary storage of unwanted wasteful stocks.

In my opinion the cuts will be made immediately in the nature of 350,000 barrels per day. If this is not enough then still further cuts will be made in production to avoid unnecessary inventories.

The oil industry will never again be faced with a glutted market.

Our industry and our regulatory authorities have long ago learned how to prevent such avoidable waste. The earth is the best place to store our oil. We are going to produce it only as needed to meet current consumption demand.

With a balanced supply and demand under sound conservation laws the oil industry goes into 1947 with the best outlook in its history.

CONSERVATION NO. 1 PROBLEM

By ERNEST SHAMBLIN
Executive Manager
National Oil Conservation Committee

The National Oil Conservation Committee is of the opinion that the most important problem affecting the production, conservation, and utilization of oil in America today is the adoption of measures to conserve the tremendous proven reserves beneath our marginal wells through prevention of their premature abandonment and the application of secondary recovery methods. We need not point out the increasing value of oil from our stripper reserves.

Those who believe in America's future also believe in an expanding, ever-growing, greater-producing economy. In order to insure our ability to meet growing future demands we recommend that proper action be taken at this time to prevent the abandonment of reserves which the American people will inevitably need in the years to come. If a conservation payment will help insure their preservation, it would seem a small price to pay for the benefits derived. This is particularly true in that the payments themselves are self-liquidating by the tax revenues assessed on the oil which are lost with the cessation of production caused by well abandonment. For the oil industry not to recognize the stripper well problem would constitute a failure to meet its responsibilities and would be an open invitation for federal agencies to stop in for the public interest.

OIL TO SHARE NATIONAL PROSPERITY

By ROBERT H. COLLEY
President, Atlantic Refining Company

I think present conditions warrant the belief that a period of record-breaking national prosperity can be enjoyed in the near future. This prospect makes the outlook for new high demands for petroleum products at profitable prices also bright. How long record prosperity will last

I do not know, but the associated economists tell us that "There are no economic reasons why . . . (it) . . . cannot . . . last indefinitely . . . " A short-lived prosperity is hardly worthy of the name.

The greatest threat to our industry's prosperity is not the possibility of shortage of domestic raw materials, or inter-industry or overseas competition, but the threat common to all industry, of general economic dislocation. Obviously, our industry cannot long be prosperous without general prosperity. Keeping workers busily engaged making and serving what our citizens desire is our greatest conservation problem.

On the technologic side we are well organized and making progress. Substantial gains are achieved largely through research and courageous management planning. But on the economic side we periodically lose heavily by recession and depression. The conditions for continuous effort must be discovered, established and maintained.

The economic side, including quantitative industrial relations is complex. Important factors are hard to measure; equilibrium relationships difficult to effect; many aspects controversial. Controversy discourages progressive action. However, I think that there is nothing strange about "economic" controversy. Current and prospective economic problems should be examined in the light of history. Often in their early stages of development scientific and technical matters have been highly controversial, and the subjects of sharp debate. But sooner or later they have been resolved and progress recorded. Can we expect other types of problems to follow a different course?

ASSURED MARKET NEEDED

By RUSSELL B. BROWN
General Counsel, I.P.A.A.

The need of the oil industry in order to meet its historical responsibility of providing an assured and adequate supply of petroleum is for large-scale exploration for new fields. To assure the intensive wildcatting effort that is needed, the domestic industry must have assurance that there will be a market for the oil it may discover.

The uncertainty caused by the increase in imports and the emphasis placed by certain government officials on further subordination of the domestic industry to foreign sources of petroleum supply must be removed before the independent producers of oil can proceed with confidence. They must have the assurance of their government that their efforts will not be nullified by the enormous quantity of foreign reserves which are available for place in our domestic markets.

This, I consider our number one problem.

CONTINUED HEALTHY DEMAND

By R. G. FOLLIS
President, Standard of California

It appears to me that the oil industry is approaching some of the most promising times it ever has experienced. The main reasons for this belief are the factors of supply and demand. The time of overloaded markets may be largely past.

The domestic reserves of producing and integrated companies will assume more importance as world demand for petroleum increases. But while the domestic producer will have a ready market for whatever he can produce, there is some questions as to the extent to which American sources can meet increased needs in the United States and other parts of the world.

Since more people everywhere are using petroleum as a source of power and heat, the long-term aspects of the oil industry point to continued healthy expansion even though there may be occasional minor deviations from that pattern.

OIL INDUSTRY WILL MEET RISING DEMANDS

By EUGENE HOLMAN
President, Standard Oil Co. (N. J.)

Sales of petroleum products in the United States are higher today than they have ever been. A greatly increased peacetime demand for oil has more than made up for the sudden shrinking of war-time requirements. Reasonable prices have prevailed in spite of these new demands.

Excluding Russia, the world's requirements for oil this year will total about 7,200,000 barrels daily. World demand, again excluding Russia, is expected to increase to about 8,350,000 barrels daily by 1950—an increase of 16 percent.
Only four percent of the world merchant fleet tonnage in 1914 ran on oil, but in 1945 over 75 percent was oil burning. The Diesel horsepower installed in the United States increased from 5½ million in 1935 to 45 million at the end of 1945. Railroads in this country are turning increasingly to Diesel engines, and even in England the railroad companies are changing from coal to oil. After their unfortunate experience of depending on imported coal for their power plants, the Italians are turning to oil for generating electric power.

To meet this tremendous demand, a great increase in supply will be needed, but the future holds plenty of oil. Our geologists believe that in this country alone we shall discover new reserves at least equal to the vast quantities already discovered. The truth of the matter is that, under the stimulus of vigorous competition, the art of finding oil has been steadily improved. Furthermore, we have learned how to extract more of the oil we find. A few decades ago it was not unusual to recover only about 20 per cent of the oil in a new field. Today we recover as high as 80 percent.

Also, this country possesses large reserves of natural gas almost equal in energy value to proved reserves of petroleum. Modern science has taught us how to convert this natural gas to gasoline at a cost already approaching the cost of gasoline from oil. And back of these reserves are the country's shale oil and coal, which are great sources of liquid fuel.

We may look forward to the steady development of oil resources in other parts of the globe. If imports are needed, they can supplement our domestic supply and enable us to keep production at the maximum efficient rate.

We are hopeful, too, about the rewards of continuing research and development. We are already prepared with equipment and processes to produce the new high-octane fuels of tomorrow —just as soon as the automobile industry can provide cars to take advantage of them.

The oil industry has been particularly fortunate in its employee relations. Over the past two or three decades there has developed a general willingness among employers and employees to sit down together and find solutions to the same human problems created by modern industry.

Out of this spirit and practice of cooperation have come good wages, healthful working conditions, thrift plans, annuity benefits and insurance. Productivity, aided by technological advances, has increased. Most important of all, a practical basis has been established for continued progress toward the goals of all of us who work for a living—better opportunities for individual improvement and advancement, more satisfactory safeguards against insecurity.

GENERAL CONDITIONS WILL AFFECT OIL

By S. J. DICKEY
President, General Petroleum Corporation

From the present outlook the coming year will present no special problems peculiar to the oil industry. The one most serious question confronting industry as a whole is whether labor disturbances will depress industrial and business operations in general. If that proves to be the case, of course it will have a detrimental effect on the business of the oil companies.

Miguel Aleman, recently inaugurated President of Mexico.

Senator Antonio J. Bermudez, new director general of Petroleos Mexicanos.

NEW PETROLEUM CHIEF STATES MEXICO'S POLICY

ORDER and work and development by its own efforts without the aid of foreign capital of any kind is, in substance, the announced policy for reorganization of the Mexican oil industry promised by Antonio Bermudez, the new Pemex director general. That policy broadly reflects the general plan for the conduct of national affairs announced by President Miguel Aleman who will be the executive head of the Mexican government until November 30, 1952. Bermudez, an Army General and a Federal Senator, comes to Pemex with a record as an able administrator. One of his achievements was, as municipal president, raising Ciudad Juarez, Chihuahua, opposite El Paso, Texas, from a one-street, lazy town to a thriving city.

Saying that Pemex must be run like any private company, with due emphasis on economy, efficiency and service, Bermudez declares that his administration recognizes the rights of the workers but will insist that they completely meet their obligations to the company and to the nation. Pemex's new organization has two assistant directors—Lic. Julio Serrano Castro, in charge of company-employee relations, and Ing. Manuel Amor, supervisor of technical phases of Pemex. One of Bermudez's first official acts was to order Serrano Castro to settle as quickly as possible pending oil labor matters, which after a brief smouldering, following such displays of violence as seizure of plants and offices and clashes with guarding federal troops at Poza Rica, boiled up again with a new threat of a general strike. Bermudez wants a lasting understanding with labor. Said he:

"Pemex must function like any other business with prime attention to its economy. Those bases are not exclusively for Pemex but are the key to success in any business. We must increase productive capacity. I consider that the capital of petroleum is fundamentally represented by its reserves which must be increased and to that end drilling must be intensified and the program of oil and gas pipeline building and expansion must be pushed to cut distribution costs and relieve congestion of the National Railways. I also consider that profits are likewise important, for on them is based attention to the workers' demands, the execution of works and the covering of general expenses. Therefore, the economic situation must necessarily govern Pemex's operations.

"The company's mission has enormous significance because the provision of combustibles is a factor of first order for all the industries of the country and for a multitude of uses. Therefore, combustibles must be placed within reach of every part of the nation, so that everybody can have them in sufficient amounts, at an opportune time and at the lowest possible price. Only in that way can there be effective collaboration with the national industry.

"I am a friend of the workers. I sympathize with the labor movement, though I want it to be kept within the law, and I want the relations between the workers and the company to be cordial and harmonious, functioning always with equity and justice. The collective contract is the law that governs relations between employees and employers. Therefore, I hold that that contract must be complied with fully. If there are clauses in it that the company cannot satisfy because of its economic incapacity, I believe it but decent and convenient to seek an agreement with the workers to clarify with them the situation within the precise time, as the workers have the right to claim what the contract concedes them. But, at the same time, it must be kept in mind that each right carries an obligation and that the respect for both is a very great thing.

"It must always be remembered that above all and everybody are the interests of the country which we must serve as a fundamental norm of our activities. Among that which is due the workers is the construction of hospitals, schools, drainage works and other like undertakings but for that service money is necessary and to get the necessary funds it is essential that our house be in order and that an atmosphere of work prevail in it."

The Pemex chief made it plain that the Mexican oil industry will be developed by its own efforts, that foreign capital definitely will not be invited to participate in the business. That statement, rather expected by those who really know the Mexican oil situation on the ground, was prompted by the revival of rumors from abroad that with the taking over of authority by President Aleman and the considerable tangle in which Pemex is involved the law, which plainly insists that the oil business in Mexico be exclusively a Mexican endeavor might be modified to the extent of admitting some foreign financial help. Denial of these rumors and Bermudez's statement that Pemex will be run by itself are seen by private oil interests in Mexico as demonstrating that the Aleman oil policy will be the same as that initiated by President Lazaro Cardenas, he of expropriation notoriety, and followed rigidly by President Manuel Avila Camacho. However, some independent oil men in Mexico expect a modification if and when Pemex finds the job of running the business far too big for it. Bermudez said that Pemex will engage foreign technicians to aid in development of the oil industry. This is in accord with a statement made by President Aleman in the course of his inaugural address.

As the above statements indicate, it undoubtedly is the purpose of the new administration to treat the workers with all fairness and with as much liberality as the financial position of Pemex makes possible. At the same time there is a definite warning that in order to receive such treatment the workers must do their part by working regularly, rendering a fair return for their re-

Petroleos Mexicanos Balance Sheet

(As of November 30, 1946)

Circulating and Working Assets

Available		**Pesos**
Cash on hand and in banks		11,398,710.61
With agencies abroad		219,023.94
		11,617,734.55
Documents and Accounts for Collection		
Documents for collection and net balances in hands of buyers of products		18,569,014.88
Accounts for collection for services		6,471,205.92
Anticipatory payments to workers		1,352,734.66
		26,392,955.46
Inventories		
Crude Oil		8,079,796.37
Refined products		67,114,506.33
		75,194,302.70
Manufactured Articles		5,828,563.38
Other products		1,861,659.52
Materials and accessories		108,391,797.19
Less reserve for old accounts		19,846,154.73
		88,545,645.46
		170,930,171.06
		208,940,861.07
Investments and Securities		
Investments		32,137,618.93
Deposits in guarantee of contracts and various accounts		2,348,825.62
Credits abroad, less reserve for collection		21,279,694.09
Claims upon insurance and other companies, less reserve		2,374,403.44
Ex General Administration of National Petroleum Depurate assets		890,155.68
Pepurate liabilities		711,088.97
		179,066.71
Fixed Assets		
Goods of this kind apportioned by the Federal Govt.	*Or. Value*	*Net Bal.*
In March, 1939	154,439,585.93	
Less Dep. & Am.	133,734,100.32	
		20,705,485.61
Goods ex GANP	13,780,655.44	
Less Dep. & Am.	13,780,655.44	.....
Lands ex GANP	15,673,126.62	
Less Dep. & Am.	.....	15,673,126.62
Goods Acquired		
Lands	1,206,618.73	
Less Dep. & Am.	.....	1,206,618.73
Wells	44,009,378.27	
Less Dep. & Am.	20,192,144.48	23,817,233.79
Field Cons.	13,006,133.89	
Less Dep. & Am.	13,006,133.89	.....
Movable, immovable goods	318,713,492.07	
Less Dep. & Am.	46,877,153.15	
		271,836,338.92
Fleet	20,223,974.54	
Less Dep. & Am.	8,082,471.03	
		12,141,503.51
Total Or. Value	581,052,965.49	
Less Dep. & Am.	235,672,658.31	
		345,380,307.18
Contracts, concessions, net value		122,286.47
		345,502,593.65
Deferred charges		1,802,291.63
		614,565,355.14

Liabilities, Patrimony and Surplus

Short Term Obligations	**Pesos**
Documents for payment in a year or less	34,431,457.44
Purveyors	1,975,670.47
Credits for contracts	223,867.59
Taxes due (Credits that are being liquidated when they fall due	21,660,319.11
Wages and other remunerations due	2,661,802.01
Wages and other remunerations ready for payment	13,880,508.70
Royalties, rents and interest falling due	392,641.03
Accounts for payment for various persons	24,383,435.47
	99,609,701.82
Federal Government—Balance in its favor (chiefly 10% of Pemex's gross income to pay for the expropriation)	20,688,285.97
Long Term Obligations	
Promissory notes in favor of Nacional Financiera, S.A. (official fiscal agency)	29,100,000.00
Claims collected for seized vessels	6,536,808.87
Obligations frozen because of the war	3,508,603.46
	39,145,412.33
	159,443,400.12
Added to the exigible liabilities	2,834,428.81
Credits pending adjustment, contingent obligations	
Credits in favor of the Federal Government (i) Anticipation of 10% of future gross revenues, in accord with Article 10 of the Decree of Dec. 1, 1944 for indemnification of the expropriated American companies	82,414,925.48
Less future charges to operation costs	82,414,925.48
	00,000,000.00
Credits subject to the condition established by Article II of the Decree of Dec. 1, 1944:	
Royalties	6,399,238.66
Interest on the patrimony	19,094,097.00
	25,493,335.66
Provisions for various credits	58,672,689.92
	84,166,025.58
Special Reserves	
Dep. of ships. Fed. Govt. seized	7,741,288.29
Spec. rep. of ships	876,101.65
Fixed plant auto fire ins.	4,132,977.13
Auto ins. for lesser sea fleet	748,089.28
Pensions for personnel	8,171,687.86
Explorations	21,042,521.29
	42,712,665.50
Patrimony and Surplus	
Patrimony	324,726,019.68
Surplus	240,545.12
Credit accounts 487,430,746.64	
Debit accounts 486,988,476.26	442,270.38
	614,565,355.14

(i) Indemnifications that must be paid Mexican Eagle and subsidiaries are not included in this account, the amount of which will be known when the agreements are made.

muneration and avoiding the illegal work stoppages that have so seriously hampered operations in the past. If that part of the bargain is not kept it is quite possible that the government may contract with outside operators to perform needed works of development on some contingent basis short of the granting of concessionary rights. As a matter of fact, the question of foreign participation in Mexican oil operations under present conditions is largely academic in the opinion of many informed persons because the best terms that could be offered would not be inviting to outside capital.

"As conditions exist at present in our oil industry, no sane capitalist would risk a centavo of his money in it," said the outspoken Confederation of Chambers of Commerce, which from time to time issues scholarly criticisms of what it considers to be wrong with Mexico and what it believes must be done to right or at least mitigate that wrong. That significant remark was made in a statement by the Confederation lamenting that while Pemex is not making satisfactory progress Venezuela is substantially developing her industry and agriculture largely from taxes yielded by the private operation of the oil industry in that country.

Bermudez is no swivel chair executive. He has gone out to see for himself the conditions existing in the producing branch of the industry, with an inspection of the northern and southern zones, along the Gulf Coast.

Ultimate better distribution of more oil products, including urgently needed gasoline and the speciality, airplane gasoline and high-octane automobile fuel, is counted upon with the placing in service through one of the last official acts of President Avila Camacho, of the improved, modernized and expanded refinery that Mexican Eagle built at Azcapotzalco, D.F., and expanding and improving the pipeline from Poza Rica that services it. These jobs cost 110,000,000 pesos. Though Pemex has said nothing of late about the proposition, it is learned that preparatory work is continuing for the construction of a large refinery at Salamanca, Guanajuato, intended to accelerate and expand distribution of Pemex products in far-flung western and northwestern Mexico. This refinery will be serviced from Poza Rica with an off-shoot extension of the line to Azcapotzalco.

Before it really starts any major undertaking in 1947, Pemex is apparently determined to straighten out its labor situation, so as to have freedom, in that regard, for the pushing of those works. The company has sent its wage balancing committee, Armando Muñoz, chairman, to Tampico to do its utmost toward conciliating oil labor leaders of the northern zone, particularly those of sections one and 33 which are aggressively clamoring for pay balancing and other benefits. The demanded balancing of wages is

(Continued on page 68)

VENEZUELA'S 1946 PRODUCTION REFLECTS

VENEZUELA'S 1945 oil production of 323,-361,000 barrels which placed the country second among the oil-producing nations, has been surpassed substantially in 1946. Although accurate production figures now available cover the first ten months only, it is estimated that the country's full 1946 production will approximate 391,482,000 barrels. This represents an increase of 68,121,000 barrels over 1945 or 21 per cent.

During this week ending January 1, 1946, the country's daily average production was 965,871 barrels. During the week ending November 18, the daily average had risen to 1,142,022 barrels, an all-time high.

Of the total production, the fields of Western Venezuela accounted for 269,655,000 barrels for about 68.9 percent. The Bolivar Coastal field alone produced 228,542,000 barrels or 58.4 percent of the country's total. The fields of Eastern Venezuela accounted for 121,827,000 barrels or about 31.1 percent of the total. The Jusepin-Santa Barbara-Travieso area was the most productive in the East, with 44,362,000 barrels or about 11.3 percent of the country's total. The Guara (Guico) area, one of the newer producing areas of Eastern Venezuela, accounted for 31,-435,000 barrels, and indications are that it may become the leading eastern producing area.

All of the major companies, with the exception of Consolidated, participated in the increased production. Creole Petroleum Corporation, the leading producer, showed an increase of 34,280,000 barrels, or a gain of 20 percent over 1945. The Bolivar Coastal field accounted for about 86.7 percent of this increase, with the remainder coming mainly from the Quiriquire field.

The Shell Group registered an increase of about 17,880,000 barrels over 1945, or an approximate gain of 22 percent. Of this, about 8,214,-000 came from the Bolivar Coastal field, 7,565,-000 from La Paz field, and 2,072,000 from the Mara field. Increases were recorded from Mene Grande and Los Manueles, but La Concepcion and Las Cruces showed decreases.

Mene Grande Oil Company showed an increase of about 11,950,000 barrels, or about 22 percent over 1945. Contributing to this increase, were the Bolivar Coastal field with about 2,636,000 barrels, the Travieso section of the Jusepin-Santa Barbara field with about 871,000 and the Guara area with 4,870,000. Increases were noted also in the Leona, Nipa, and Yopales fields.

Socony-Vacuum Oil Company's estimated production of 8,108,000 barrels for 1946 is almost double its 1945 total. During the month of October, Socony replaced Consolidated Oil Company as Venezuela's fourth largest current producer. The increase came largely from the Guara (Guico) area. The Texas Company was another of the smaller producers that almost doubled its output during the year. The largest contributor to this increase was the Tucupita field of the Delta Amacuro which increased its production over 1945 by about 372,000 barrels. Increases were recorded also at Santa Ana (Rincon), Las Mercedes, and Caritos.

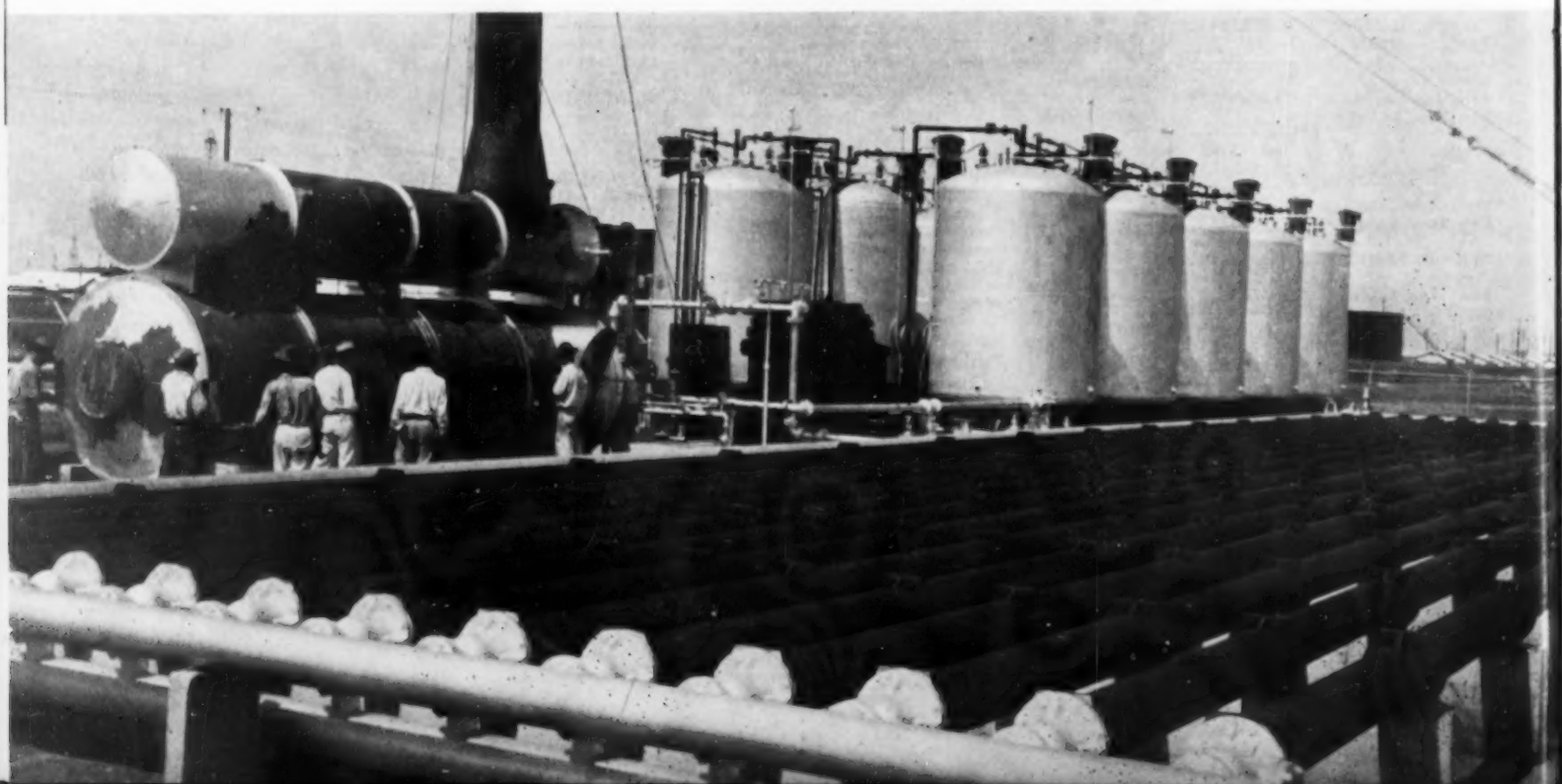
The three leading producers, Creole, Shell, and Mene Grande, together accounted for a total of 371,641,000 barrels, or almost 95 percent of the 1946 total.

A review of Venezuela's cumulative production through 1946 by fields and companies is shown in Tables I and II. It will be observed that the cumulative total for all Venezuela amounts to 3,600,041,000 barrels. Of this, Western Venezuela has produced 2,945,906,000 barrels or 81.8 percent; and Eastern Venezuela has produced 654,135,000 barrels or 18.2 percent. Of the production in Western Venezuela, the Bolivar Coastal field contributed 2,416,881,000 barrels, which is approximately 82 percent of the cumulative total for Western Venezuela, and 67 percent of the country's cumulative total.

The second largest producing field in the West has been the Mene Grande Oil field of the Shell Group which has produced a total of 291,428,000 barrels or about 8 percent of the country's cumulative total.

The outstanding producer of Eastern Venezuela

Lagunillas dehydration plant, Bolivar coastal field.



RISING WORLD DEMAND

By ANNE NEWMAN SUTTON

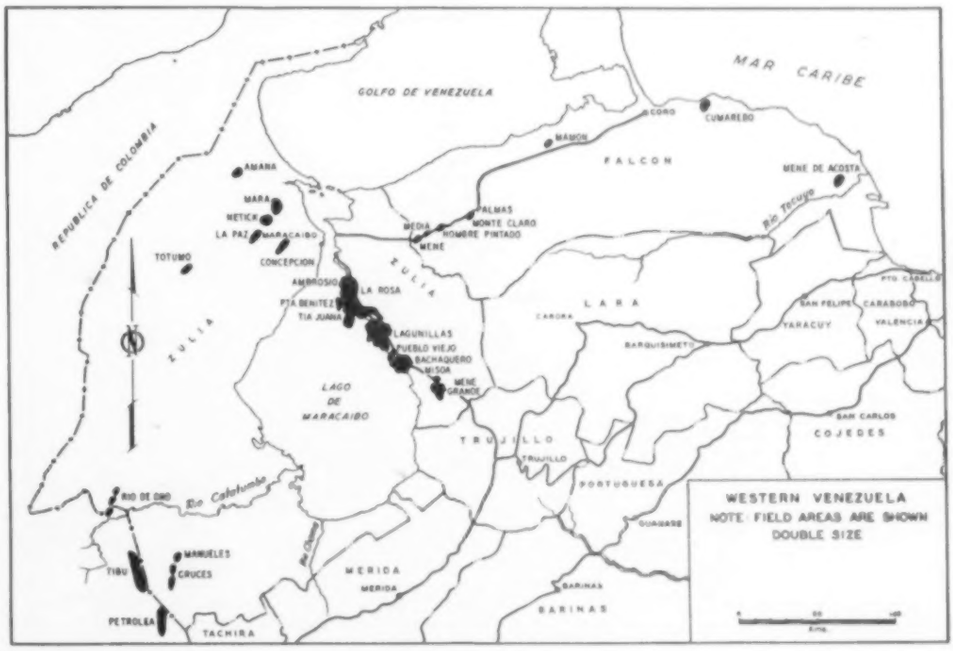
has been the Quiriquire field of Creole Petroleum Corporation. Its estimated cumulative production at the close of 1946 amounts to 258,846,000 barrels, or 7.2 percent of the country's cumulative total. The second largest producer in the East has been the Greater Jusepin-Santa Barbara-Muri field with a cumulative total at the close of 1946 of about 145,767,000 barrels or four precent of the country's cumulative total.

During the first ten months of 1946, a total of 510 wells were reported as having been drilled in Venezuela. Of these, 304 were drilled in Eastern Venezuela and 206 in Western Venezuela. It is estimated that the 1945 total of 533 will have been surpassed by a wide margin by year's end. Of the total reported up to the close of October, 457, were completed as oil wells, two as gas wells, and 51 were dry holes. Of the 48 wildcats drilled, 8 resulted in new field or new pool discoveries.

Creole's greatest activity was centered in the Jusepin-Mulata area where 108 wells were drilled of which 103 were successful completions and five were dry holes. Of the five dry holes, two were classed as new pool tests and one as a new field test. In the Quiriquire field, 11 wells were drilled as producers and two outlying new field tests were dry holes. Five development wells were completed successfully at San Joaquin and one at Roble. In the large Barbacoas exploration block in Northern Guarico, Creole drilled three wildcats. One was completed as a small gas well and two were abandoned on account of mechanical difficulties. Three additional unsuccessful wildcats were drilled in Eastern Venezuela. In Western Venezuela, Creole completed 59 oil wells in the Bolivar Coastal field and one in the Cumarebo field of Falcon. Five new pool wildcats were drilled on exploration acreage in the western part of Lake Maracaibo. Of these, one was a small producer and four were dry holes.

The Shell Company drilled 80 successful field and outpost wells in the Bolivar Coastal field. Six successful completions are reported from La Paz field, 13 from Las Cruces (Tarra), one from Los Manueles, seven from Mene Grande, and three from Mara (Tetones). Shell's wildcat completions in the west were limited to a geological exploration well near El Mojan, north of Maracaibo. At the present, WT-2, a wildcat in the Colon district, and C-148, a deeper pool test in the Concepcion field are drilling. Due to mechanical difficulties, Curacao 2A has been temporarily suspended at 15,106 feet. It is located 18 kilometers east from the Cabimas district of the Bolivar Coastal field, and is the deepest well in South America. Previous to the drilling of this well, the depth record was held by Shell's R-801 located about 14 kilometers to the west. In Eastern Venezuela, Shell drilled three geological exploration wells in Anzoategui.

In Western Venezuela, Mene Grande's operations were confined to the Bachaquero and the Pueblo Viejo districts of the Bolivar Coastal field where 21 producing wells were drilled. Mene Grande's greatest activity in Eastern Venezuela was centered in the Guara area where 27 wells were completed successfully. Of these GM-4 was the discovery well of a new pool to the west of the West Guara field. Twenty-two oil wells and one dry hole were drilled in the Travieso area offsetting the new pool discovery made by Phillips early in the year. Ten wells were completed successfully in the Oficina field and one in the Santa Rosa field. At East Nipa, two wells were completed, one of which was the discovery well for the field. Of the wildcats



Installing a manifold for oil and gas separators in the Jusepin field in Eastern Venezuela

drilled by Mene Grande, five were new pool or new field discoveries.

Socony completed 18 oil wells in the Guara (Guico) area of Eastern Venezuela, four on the Guario dome of the San Joaquin field, and three in the West Nipa field. Tascabana No. 1, a new field wildcat, was completed as a small gas well. Five geological exploration wells were drilled in Northern Monagas. Three unsuccessful wildcats were drilled on exploration acreage in the state of Barinas.

Consolidated Oil Company's activities during the first ten months of 1946 were confined to the Santa Barbara-Muri-Travieso area of Eastern Venezuela where 24 wells were completed as producers and three were dry holes.

During this same period the Texas Company drilled five oil wells in the Tucupita field of the Delta Amacuro. In the Mercedes field of Guarico, nine oil wells were completed and one well was drilled and abandoned temporarily. The company's wildcat activities were confined to Guarico where seven new field tests were drilled, of which one was completed as a new field discovery and six were dry holes.

Phillips Venezuelan Oil Company drilled and completed three oil wells in the Travieso area. One of these was the discovery well for the pool. Two geological exploration wells were drilled also. A wildcat is being drilled by this company near Calabozo in Western Guarico.

Venezuelan Atlantic Refinging Company, whose activities are confined to Eastern Venezuela, had drilled five unsuccessful wildcats at the end of October. At this writing, four other wildcats are drilling.

When Richmond Exporation Company abandoned Montanita No. 1 in Falcon, in March of 1946, at a depth of 9,970 feet, it transferred its equipment to the state of Zulia, west of Lake Maracaibo. There, the company has suspended temporarily its Zulia 1-1 at a depth of 9,835 feet, and is drilling four other wildcats in the area.

Orinoco Oil Company drilled Calentura No. 2, a wildcat located about seven kilometers northwest from the Netick field in Western Venezuela. The well was abandoned at 10,290 feet in the Cretaceous. Excellent heavy oil saturation was encountered in this formation. Preparations are under way to drill a deep Cretaceous test in the Netick field. Prospects for Cretaceous production are excellent inasmuch as the field lies along the same trend and between La Paz and Mara fields, both of which are prolific Cretaceous producers.

Barnsdall South American Corporation, a newcomer to Venezuela, drilled five unsuccessful wildcats in Eastern Guarico, near the boundary of Anzoategui and about 15 kilometers southwest from the city of Pariaguan.

Drilling and Exploration Company (Guasare Oil Company) has been active in the small Amana field in the District of Mara, Zulia. One oil well was completed and two were drilling at the end of October.

At the end of the period under review, 130 rigs were operating in Venezuela of which 90 were in the East and 40 in the West. Of the total, 54 were on wildcat status.

A number of new discoveries of importance were made in Eastern Venezuela during the year. In January, Mene Grande Oil Company's new field wildcat, CaM-1, was completed as a producer in the Caico Seco area of Anzoategui about 30 kilometers northwest from the Oficina field. In March, the same company completed successfully its La Ceiba No. 1 new field wildcat in northeastern Anzoategui, about 30 kilometers northeastern from the Santa Rosa field and 57 kilometers west from the westernmost extension of the Jusepin-Santa Barbara trend in Monagas. In February, Mene Grande completed GM-4, about four kilometers west of the West Guara field, as a 700 barrel producer, and at the close of October, ten wells had been completed. Of these, six were drilled by Mene Grande and four by Socony, which owns offsetting acreage. It is possible that this discovery may be only an extension of the West Guara field. Well OS-31, about three kilometers north of production in the Oficina field, was completed as a producer by Mene Grande in October, and is expected to add

Table I

Venezuela's All Time Production by Fields - Thousands of Barrels *

Field	Operators	Total Through 1944	1945	1946	Total Through 1946	Percent of 1946 Grand Total	Percent of Grand Total Through 1946
EASTERN VENEZUELA							
Quiriquire	Creole Petroleum Corp.	225,826	14,457	18,563	258,846	4.74	7.19
Pedernales	Creole Petroleum Corp.	9,036	—	—	9,036	—	0.25
Jusepin (Sta Barbara-Muri-Travieso)	Creole-Consolidated-Mene Grande	58,834	42,571	44,362	145,767	11.33	4.05
Oficina	Mene Grande Oil Co.	78,878	15,260	12,994	107,132	3.32	2.98
Guara (Guico)	Mene Grande-Socony	9,241	20,711	31,435	61,387	8.03	1.71
San Joaquin (Guario)	Creole-(Socony)	10,999	5,746	5,528	22,273	1.41	0.62
Roble (Anaco)	Creole-Socony	8,657	1,743	1,591	11,991	0.41	0.33
Temblador	Creole Petroleum Corp.	18,082	2,102	2,285	22,469	0.58	0.62
Quiamare	Mene Grande Oil Co.	367	94	74	535	0.02	0.01
Santa Ana	Mene Grande-Texas	861	820	941	2,622	0.24	0.07
Santa Rosa	Mene Grande Oil Co.	1,640	548	530	2,718	0.14	0.08
Leona	Mene Grande Oil Co.	2,711	733	1,845	5,289	0.47	0.15
Nipa	Mene Grande-Socony	—	4	938	942	0.24	0.03
Las Mercedes	Texas Petroleum Co.	17	16	60	93	0.02	—
La Ceiba	Mene Grande Oil Co.	—	—	60	60	0.02	—
Caritos	Texas Petroleum Co.	105	7	59	171	0.01	—
Tucupita	Texas Petroleum Co.	—	15	387	402	0.10	0.01
Aripa	Atlantic Refining Co.	—	35	24	59	—	—
Yopales	Mene Grande Oil Co.	167	—	151	318	0.04	0.01
Others		2,018	7	—	2,025	—	0.06
	TOTAL	427,439	104,869	121,827	654,135	13.12	18.17
WESTERN VENEZUELA							
Bolivar Coastal	Creole-Mene-Shell	2,001,478	186,861	228,542	2,416,881	58.38	67.14
Cumarebo	Creole Petroleum Corp.	32,461	1,885	1,771	36,117	0.45	1.00
Concepción	Shell (V.O.C.)	27,764	1,355	1,114	30,233	0.28	0.84
La Paz	Shell (V.O.C.)	11,147	8,049	15,614	34,810	3.99	0.97
Mene Grande	Shell (C.P.C.)	265,453	12,831	13,144	291,428	3.36	8.10
Los Manueles	Shell (C.D.C.)	33,888	1,933	1,953	37,774	0.50	1.05
Las Cruces (Tarra)	Shell (C.D.C.)	54,957	3,873	3,810	62,640	0.97	1.74
Mara (Tetones)	Shell (C.P.C.)	—	1,141	3,213	4,354	0.82	0.12
El Mene	British Control Oil.	22,769	176	166	23,111	0.04	0.64
Hombre Pintado	British Control Oil.	3,256	242	224	3,722	0.06	0.10
Netick	Orinoco Oil Company	201	146	99	446	0.03	0.01
Others		4,385		5	4,390	—	0.12
	TOTAL	2,457,759	218,492	269,655	2,945,906	68.88	81.83
	GRAND TOTAL	2,885,198	323,361	391,482	3,600,041	100.00	100.00

* Production estimated for November and December—1946.

considerably to the reserves of the greater Oficina field. In May, Mene Grande completed NS-1, the discovery well of the East Nipa field, about 11 kilometers northeast of the West Guara field and 12 kilometers east of NV-1, the discovery well of the West Nipa field which was brought into production late in 1945.

In October, Phillips finally completed successfully its well FT-1, which early in the year opened a new producing area about seven kilometers west of the westernmost production along the Jusepin-Santa Barbara trend. It will be recalled that the well caught fire and the company had considerable difficulty effecting its completion. Mene Grande has exploited actively its Travieso offset area to the east.

In January, Socony completed its Tascabana No. 1 as a small gas well in an unproved area in central Anzoategui about 17 kilometers northwest from Oficina field and 28 kilometers west from the West Guara field.

Texas Company completed its new field wildcat, Grico No. 1, as a producer in February. This well is located in north central Guarico about 40 kilometers west of Las Mercedes field.

On December 1, Atlantic completed successfully its new field wildcat, Pelayo No. 1, situated along the trend and 16 kilometers east of the Leona field in Eastern Anzoategui. The well gauged 800 barrels per day of 30.1 Gr. oil on a 3/8" choke. Production is from a ten-foot sand in the Miocene. The well was drilled to a total depth of 8,120 ft. and plugged back to 7890 ft., the approximate depth of the producing horizon. This well is located on the Pelayo concession of the Pantepec Oil Company and is one of the concessions included in the Atlantic Pantepec contract.

There was no important discovery in Western Venezuela during the year although Shell is reported to have encountered encouraging results in its wildcat WT-2, about 13 kilometers west of Las Cruces (Tarra) field in the district of Colon, Zulia.

The extensive field exploration program which was initiated in 1945, has been accelerated appreciably in 1946. At the close of October, 20 geological, 27 seismograph, and 13 gravimeter parties were engaged in field studies. In addition to these, one magnetometer party was employed by Phillips in Guarico. The studies extended

Table III

Venezuela's Seven-Year Production Record

Year	Barrels Production
1940	186,134,000
1941	228,131,000
1942	147,984,000
1943	179,399,000
1944	257,034,000
1945	323,361,000
1946*	391,482,000

*Last two months of 1946 are estimated.

Flow station in the Quirquire field in Eastern Venezuela.

all the way from the Delta Amacuro on the east to the Perija Mountains on the west, and were confined principally to the large holdings of exploration acreage which were acquired under the 1943 petroleum law. The exploration period for most of these concessions will expire in less than 18 months at which time the companies must exercise their privilege under the law to select the acreage they wish to retain. This cannot exceed 50 percent of the exploration concession. The remainder reverts to the government as national reserves.

Table II

Venezuela's All Time Production by Companies - Thousands of Barrels *

Company	Total Through 1944	1945	1946	Total Through 1946	Percent of 1946 Total	Percent of Total Through 1946
EASTERN VENEZUELA						
Creole Petroleum Corp.	315,444	51,120	55,784	422,348	14.25	11.73
Mene Grande Oil Co.	93,878	38,483	46,697	179,058	11.93	4.97
Consolidated Oil Co.	14,568	10,449	9,894	34,911	2.53	0.97
Socony-Vacuum Oil Co.	1,383	4,088	8,108	13,579	2.07	0.38
Texas Petroleum Co.	307	694	1,320	2,321	0.34	0.07
Atlantic Refining Co.	—	35	24	59	—	—
Others	1,859	—	—	1,859	—	0.05
TOTAL	427,439	104,869	121,827	654,135	31.12	18.17
WESTERN VENEZUELA						
Creole Petroleum Corp.	943,787	120,474	150,091	1,214,352	38.34	33.73
Shell Group	1,099,735	81,453	99,333	1,280,521	25.37	35.57
Mene Grande Oil Co.	384,349	16,001	19,736	420,086	5.04	11.67
British Controlled Oilfields	28,653	418	391	29,462	0.10	0.82
Orinoco Oil Co.	201	146	99	446	0.03	0.01
Others	1,034	—	5	1,039	—	0.03
TOTAL	2,457,759	218,492	269,655	2,945,906	68.88	81.83
ALL VENEZUELA						
Creole Petroleum Corp.	1,259,231	171,595	205,875	1,636,701	52.59	45.46
Shell Group	1,099,735	81,453	99,333	1,280,521	25.37	35.57
Mene Grande Oil Co.	478,277	54,483	66,433	599,143	16.97	16.64
Consolidated Oil Co.	14,568	10,449	9,894	34,911	2.53	0.97
Socony-Vacuum Oil Co.	1,383	4,088	8,108	13,579	2.07	0.38
Texas Petroleum Co.	307	694	1,320	2,321	0.34	0.07
British Controlled Oilfields	28,653	418	391	29,462	0.10	0.82
Atlantic Refining Co.	—	35	24	59	—	—
Orinoco Oil Co.	201	146	99	446	0.03	0.01
Others	2,893	—	5	2,898	—	0.08
GRAND TOTAL	2,855,198	323,361	391,482	3,600,041	100.00	100.00

* Production estimated for November and December—1946.

NEW DELAYED COKING UNIT INCREASES INTERMEDIATE DISTILLATE YIELDS

By Randall Maass and R. E. Lauterbach

WITH the diesel engine, the household burner, and the light oil cracking units all competing for the intermediate or gas oil fractions, the general trend in refining is toward a more extensive cracking of the residuum fraction. It has been estimated[2] that this trend, in the next 10 or 20 years, will reduce the percentage residum from the present 26% to some 10%. It is not expected that this cracking of heavier stock will so much replace light oil cracking as that it will provide the requisite charge stock.

General Petroleum Corporation has contributed to this trend by installing a 15,000 B/D delayed coking unit to process 300-700 SSF/122°F straight run residuum. The gas oil thereby obtained will serve to supply part of the feed stock to the four TCC units. The coking unit was designed, engineered, and constructed by the M. W. Kellogg Company, and incidentally is the largest unit of its kind in the world. Coking operations were started July 26, 1946.

It is the intent of this paper to describe the coking process with particular emphasis on the equipment used therein. Some of the initial operating data too has been added.

The cracking portion of the coking unit is divided into two sections each with its own furnace and pair of coke drums to be used alternately. The cracked products from the two cracking sections enter a common bubble tower for fractionation into an overhead product of gasoline and lighter, three gas oil draw-off products, and a bottom recycle product. The straight run residuum, or reduced crude charge as it is called, is introduced into the bubble tower for further fractionation with the bulk of it appearing in the bottoms for furnace charge. Three steam strippers for the sidedraw streams and a gasoline debutanizer complete the fractionation equipment.

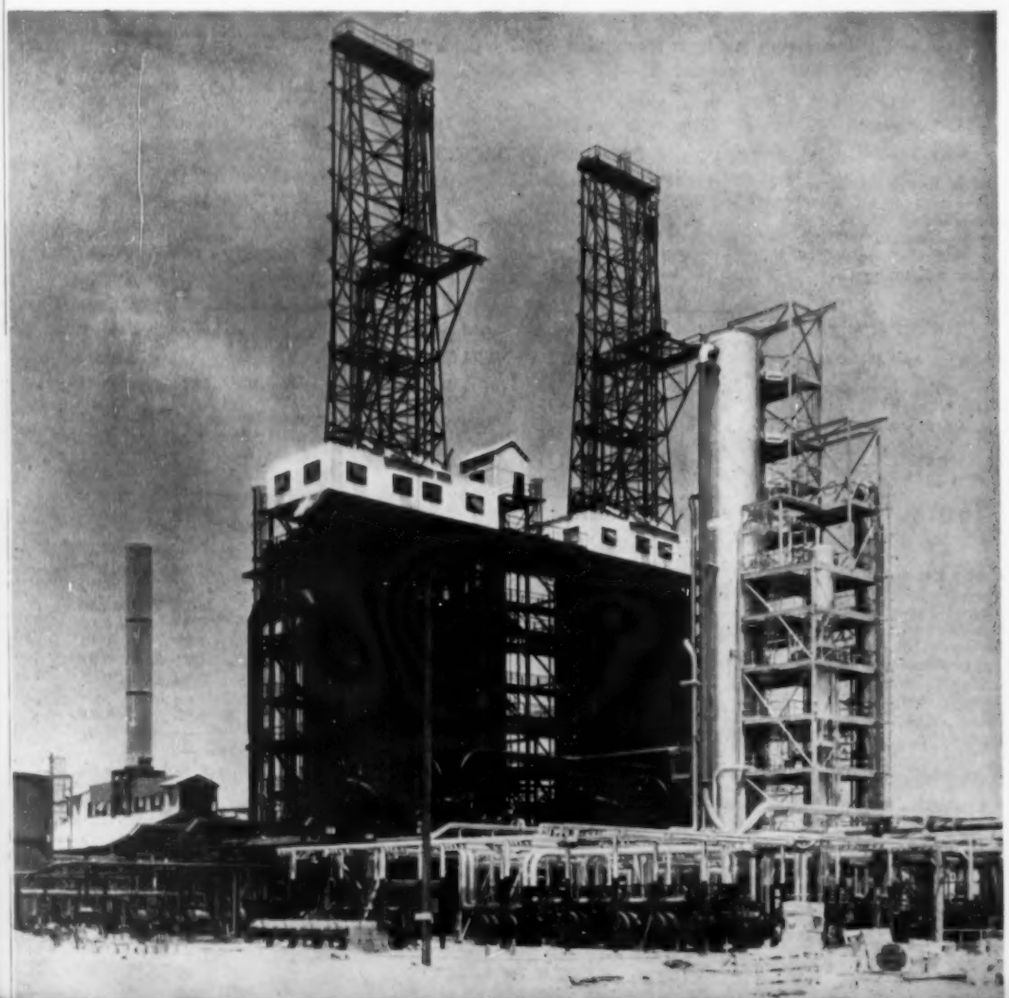
Two duplicate furnaces have been provided, one for each pair of coke drums. The highly desirable feature of a delayed coking unit is the delaying of the coking until the charge reaches the soaking chamber (coke drum). To accomplish this the furnaces are designed for a low residence time and a high rate of heat pickup. Because of the high heat level (600°F) of the furnace charge, the oil tubes were restricted to the radiant section and the hotter portion of the convection section. Heat economy is realized through the use of water tubes for steam production in the convection bank.

In general each furnace has four separate coils which join outside the firebox into a common transfer line. Alloy tubes of 9 chrome—1.5 moly are used in the radiant section and to shield the convection bank. The remaining tubes in the convection bank are 5 chrome—0.5 moly. Heat is supplied by 16 Zink combination oil and gas burners located in the end of the firebox. A waste heat boiler has been added in the convection bank of each furnace to reduce the temperature of the flue gases. This heat pick-up serves to supply 75% of the plant's steam requirement.

A continuity of operation is maintained through the use of a pair of coke drums for each furnace, one drum being in coking service while the other is being decoked. Each drum is 17 feet in diameter and 80 feet in height with 61 feet of straight section. For protection against corrosion the vessels are lined with a 7/64 inch thickness of Type 405 stainless steel, the lining being resistance-welded to the shell. Alloy steels were also used in the principal piping to and from the coke drums. The transfer lines, the vapor lines from the drums to the bubble tower, portions of the drum condensate lines, the side vapor lines, and by-pass lines are of alloy steel.

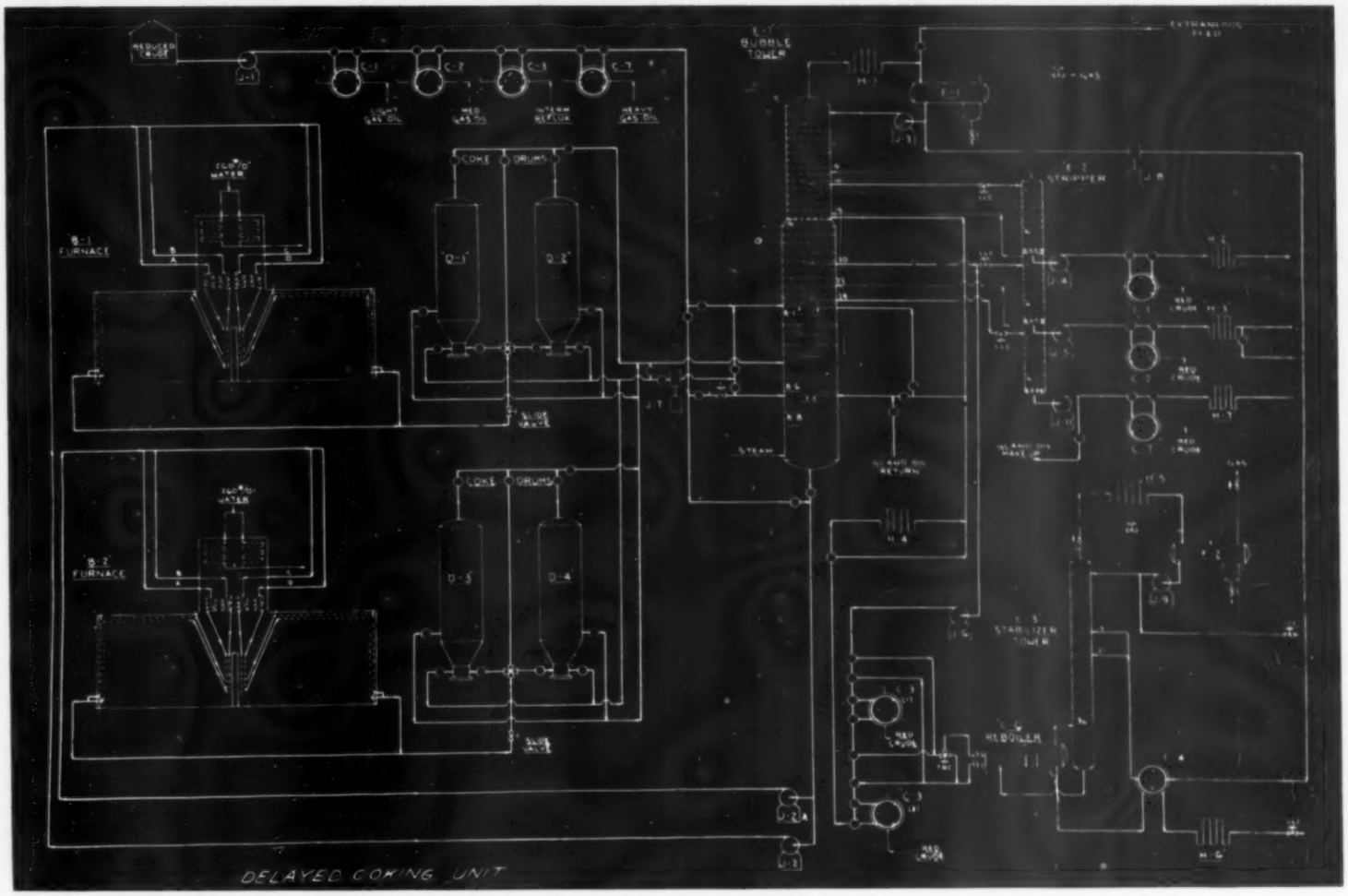
The 100-foot high bubble tower is 11 feet in diameter in its upper section and in its bottom section is enlarged to 12 feet 6 inches to accommodate the increased downflow occasioned by the introduction of the intermediate reflux and the reduced crude feed. Fifteen cast iron bubble trays are used in the upper section and in the lower section ten stainless steel bubble trays with eight cast iron baffle trays below them in the potential coking region. The shell is protected throughout by a stainless steel strip-welded lining. The three sidedraw steam strippers are

Process area at new General Petroleum delayed coking unit showing four coke drums, two derricks and fractionating equipment.



[1] *In view of space limitations this paper is slightly abridged.*

[2] *Hulse, S. H., Oil & Gas Journal, June 15, 1946—p. 93.*



Simplified flow diagram of delayed coking unit.

contained in one 4 foot 6 inches by 56 foot shell appropriately divided into three 6-bubble tray sections. The strippers are unlined and the trays are all cast iron. It will be noted that the entire hot oil section of the plant is protected from corrosion through the use of alloy steels. Some exceptions were made in the bubble tower region.

The design of the 4 foot 36-bubble tray debutanizer follows the conventional pattern. The tower is unlined and all trays are cast iron. To accommodate possible depropanization, the design working pressure was set as 330 psi.

Following our general practice open section condensing and cooling equipment is used throughout. Open sections, located in a 45-bay atmospheric cooling tower, were provided as follows:

Condensers and Coolers

Service	Total Eurface Sq. Ft.	Material Tube
Bubble Tower Overhead	10,200	Admiralty Brass
Light Gas Oil	2,020	" "
Heavy Gas Oil	3,030	Red Brass Clad Steel
Intermediate Reflux	1,140	Admiralty Brass
Stabilizer Overhead	2,280	" "
Stabilizer Bottoms	530	" "
Fuel Oil	4,660	Admiralty Brass
Gland Oil	1,060	Red Brass Clad Steel
Gland Water	1,140	" "

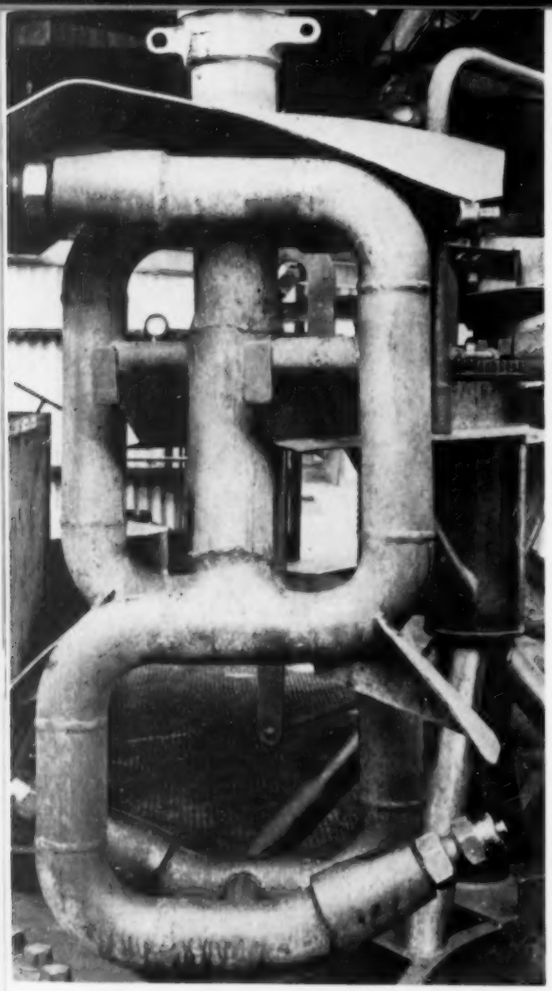
Coke is removed from the drums by a water jet designed by the Worthington Pump and Machinery Corporation, which cuts the body of coke into pieces small enough to fall into a crusher car. The crusher car breaks the coke down and feeds the sized coke into a sluice. The coke is sluiced with water into a suction pit from which a coke-water slurry is pumped to the storage area. In this area the bulk of the coke is separated from the water; the water passes through settling basins to allow any coke fines to drop out and is then returned to the unit for reuse.

The decoking water jet is supplied by a centrifugal five stage volute pump with external interstage passages. Two complete pumping units are provided; one will supply 1,100 g.p.m. at 1,500 pounds; two in parallel will supply 1,600 g.p.m. at the same pressure.

A 100-foot derrick structure is mounted over each pair of coke drums to support the drilling equipment. Each drilling assembly includes a continuous length of drill stem which is long enough to reach the whole length of the drum and to which the boring and cutting tools can be attached. The drill stem is coupled at the top to a swivel head which is rotated by an air motor and which can be raised or lowered by a steam winch. An assembly of Chicksan joints form a flexible connection to supply jet water to the swivel head.

The cutting devices for removing coke are a boring tool, a reaming tool, and a cutting tool. The boring head is essentially a round ball 10 inches in diameter which is tapped for water nozzles. (see photo) One ½-inch nozzle is located in the bottom to direct a jet straight downward, and four 3/8-inch jets are symmetrically arranged about it to direct the water rownward at about 45° from the vertical. Two 3/8-inch jets are directed upward to keep any coke fines from settling on top of the tool and stopping its rotation.

The cutting tool shown is an hydraulically designed assembly which splits the single stream of water in the drill stem into four jet streams. Two streams are projected horizontally at the top of the tool and the other two at the bottom are directed upward at such an angle that they cut the same plane as the horizontal jets as the surface of the coke drum, or at a distance of 8½ feet from the axis of the drum. The nozzle tips in this tool are replaceable and at the present time 5/8 inch tips are used in the bottom nozzles, while 7/16 inch tips are used in the top.



Hydraulic cutting tool for removal of coke from drum.

The crusher car, which grinds the coke to a size easily pumpable by the coke pump, consists of a hopper which feeds the coke to motor driven toothed rolls space 5 inches apart.

The crushed cake and the water from the jets pass between the rolls into a sluice which leads to a coke sump. An Allen-Sherman-Hoff Hydroseal coke slurry pump forces the coke-water slurry through a 12 inch line to the storage area located some 2,500 feet from the pump. At 600 r.p.m. the pump will discharge about 3,000 g.p.m. of water over a coke outlet some 38 feet above its suction nozzle through 2,500 feet of 12-inch line. Special hydraulic lift cars were designed to raise and lower the heavy bottom heads of the coke drums to facilitate coke removal.

Operation of the Unit

Reduced crude is charged to the bubble tower by Quimby screw-type charge pumps under control of a flow-controller. The reduced crude is preheated by exchange successively with the light gas oil product, the medium gas oil product, the intermediate reflux stream, and the heavy gas oil product before entering the bubble tower at two points. With a preheat level of only 450°F the feed serves as a hot reflux and care must be exercised to avoid transferring so much heat to the tower bottom product as to impair the fractionation of the tower. This condition is avoided by temperature-controlling the flow of reduced crude to the top inlet so as to maintain a constant temperature on the bottom bubble tray. The excess feed is diverted by a pressure controller to the lower inlet.

Both furnace charge pumps take suction off the tower bottom to deliver the charge to the four parallel coils in each furnace. The radiant section of each furnace is divided into two combustion chambers containing two of the coils. The fires in each combustion chamber are separately controlled to maintain a constant temperature at the combined outlet of each pair of coils. The two outlets from each furnace join in a furnace transfer line which discharges into one of the two coke drums allocated to each furnace.

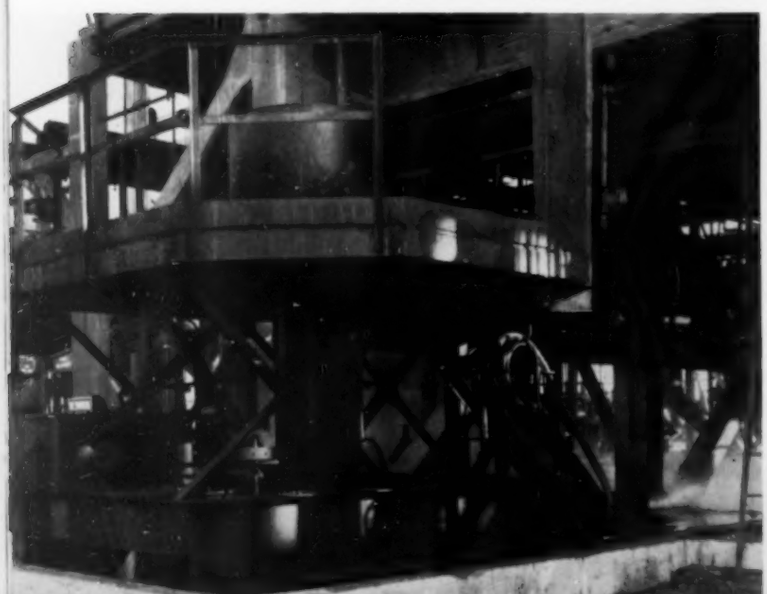
The heated mixture of vapor and liquid from the furnace enters the bottom of the coke drum. Since only vapors can pass out the top of the drum, any liquid must remain in the drum until it is cracked to vapors and coke. The coke deposited is of a highly porous nature, which facilitates subsequent handling. Each drum remains on the line for 24 hours during which time approximately 250 tons are therein deposited.

The vapors from the two drums that are in operation enter the bubble tower between the 5th and 6th baffle trays, numbering from the top. This stream supplies the sole source of fractionating heat to the tower. The top temperature of the tower is controlled to pass the gasoline and lighter streams overhead. A portion of the downflow induced by the top reflux is removed from the 10th bubble tray, steam stripped, and delivered to storage as light gas oil. The remaining downflow is augmented at the 15th bubble tray by an intermediate reflux stream and by the additional reflux thereby induced. The intermediate reflux is removed from the 20th bubble tray to be cooled by heat exchange with the fresh feed, by supplying heat to the debutanizer reboiler, and by exchange with cooling water if necessary. The intermediate reflux returned to 15th tray is rate controlled. Should it be desirable to reduce the downflow on the lower bubble trays some intermediate reflux can be manually controlled to the first baffle tray. As an added means of reducing the coking tendency in the bottom two baffle trays and the tower bottom reservoir, provision has been made to manually control some of this reflux to the seventh baffle tray if needed. The intermediate reflux draw-off is also used to remove the medium gas oil product which is stripped and cooled. The heavy gas oil, which is also stripped and cooled, is withdrawn from the 24th bubble tray.

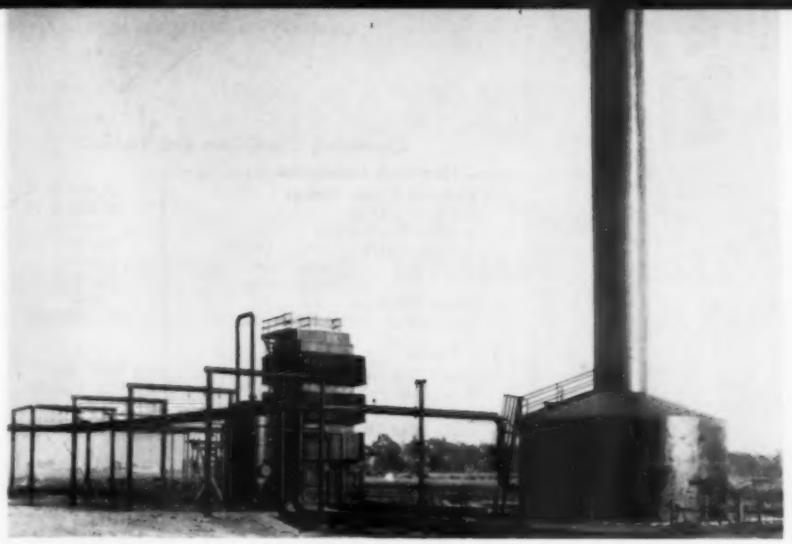
The preheated fresh feed is added to the first baffle tray as required to maintain a constant temperature on the 25th or bottom bubble tray, the remaining feed being diverted to the seventh baffle tray. The tower bottoms, which include the fresh feed and recycle, are passed to the furnaces. The lowest sidedraw is withdrawn at the rate required to maintain the tower bottom level. Under this arrangement, with a constant 20,000 B/D charge to the furnaces, the recycle rate is automatically determined as the difference between the fresh feed rate and the total furnace charge.

The bubble tower overhead is cooled and condensed in the cooling tower and is separated into gas and gasoline in the reflux accumulator. The gas flows through a back pressure controller which sets the pressure for the entire system so that the pressure on the coke drums and the bubble tower are but two to four pounds higher than the 52 pounds held on the bubble tower re-

Hydraulic lift car used for removing bottom outlet plate prior to coke removal.



Coke crusher car receiving coke from drum.



Blowdown system.

Coke is loaded into trailers with clamshell bucket. Photograph shows coke slurry being discharged.

flux accumulator. The resulting pressure at the furnace outlet rides at about 75 pounds.

The tripping and coke drum cooling team are also condensed in the overhead condensers and removed from the accumulator through a a bottom boot.

Gasoline reflux is pumped back to the top of the bubble tower under control of a temperature element located in the vapor space above bubble tray No. 2. The net gasoline make is charged to the debutanizer after heat exchange with the debutanizer gasoline. The raw B-B is delivered to raw B-B storage for ultimate alkylation plant feed and the uncondensed vapors to the central gas plant under its own pressure. For more precise control the tower pressure is maintained by a vapor line regulator. In order to insure a steady reflux flow, the accumulator pressure is controlled within narrow limits through the use of a repressuring controller, which bypasses vapors around the condensers, and a depressuring controller which relieves the excess pressure to the gas plant.

Reboil heat is obtained from the intermediate reflux stream. To reduce the tendency to polymerize the cracked gasoline the temperature of the heating stream is held to 600°F or below. Since this stream runs close to 700°F, it is heat exchanged. A temperature element. on the 34th tray controls the quantity of heating oil to the reboiler. After passing through the reboiler, or bypassing it, the intermediate reflux stream is further heat exchanged against the fresh feed and cooled if necessary before it is returned to the bubble tower.

At normal feed rates each drum is on stream coking for 24 hours and is off stream for cooling, decoking and heating up for the same period. The drum switches are so timed that one of each pair of drums comes off stream every 12 hours. Under normal conditions the cycle for one drum is about as follows:

Log of a Typical Drum Cycle

Elapsed Time (Hours)	Operation
0.0	Switch oil steam to clean drum. Steam full drum to bubble
0.5	Stop steam to bubble tower, steam to blowdown.
0.75	Stop steaming, start cooling water.
2.75	Stop cooling, start draining water, blinding and unheading.
4.0	Start decoking.
11.0	Finish decoking, start heading up and removing blinds.
12.5	Steam test.
13.0	Finish steam test.
18.0	Start heating.
24.0	Switch in oil stream from full drum.
48.0	Switch oil stream to clean drum.

Before switching the oil from one drum to another, the empty drum is preheated by forcing some vapors from the on-stream drum into the top and pumping the condensate from the bottom of the drum into the bubble tower.

Blowing down: Whenever the oil stream is switched from a full to an empty drum, the full drum must be purged of volatile oils and cooled down so that decoking operations can be started. Steam is immediately cut into it, both into the transfer line to the bottom of the durm and into a steam ring just above the bottom cone. The full drum is steamed to the bubble tower for 30 minutes and is then depressured to the blowdown. After 15 minutes steaming to the blowdown. steam is cut out and water pumped to the steam ring.

This cooling produces considerable steam which must be handled in the blowdown system located about 2,000 feet from the unit area. The blowdown line exhausts into a small tank about six feet below a water level maintained by a continuous circulation through the tank to remove the superheat of the steam and to condense any oil vapors. The overflow from the tank runs into a skimming supm to remove any oil.

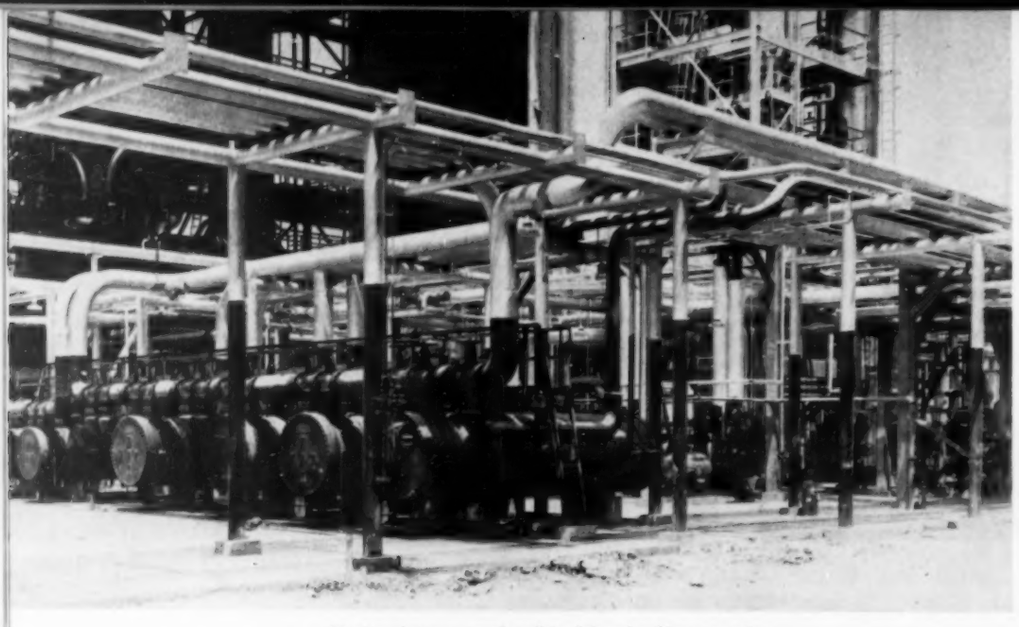
Operation of the Decoking Equipment

When the coke bed has been cooled to 200-300°F the cooling water is cut out and the drum drained. It is then ready for the decoking crew. After a drum is cooled and drained the lines

Hydraulic boring head used in removing coke from drum.

leading to the drum are blinded and the manheads removed. With the crusher car under the drum, the boring is begun with the stem rotating at about 8-10 r.p.m. The drill is lowered as fast as possible without allowing the boring tool to actually touch the coke bed. Normally about 15 minutes are required for the high velocity water to cut a hole through the coke. In the meantime the coke pump is started up and water alone is discharged through the coke line to the storage area until the boring operation is completed.

After the boring is completed, the reaming tool is moved slowly up and down until the hole has been enlarged to about 6 feet in diameter. This operation requires from 45 minutes to two hours. After reaming, the cutting tool is installed and



Heat exchangers employed in delayed coking operations.

the final cutting is begun with the drill stem rotating at about 5-10 r.p.m. The coke is cut from the top of the bed and falls down through the hole into the crusher car. Every 5-10 feet the jet is shut off and the drum is inspected for cleanliness. It has been found necessary to remove the coke completely on the way down since any ledges left behind for later removal will frequently fall into the crusher car and plug up the top grating or will bridge across the bottom of the drum.

Occasionally the coke is cut from the drum at such a rate that the coke pump, operating at medium speed, will not handle it. When this occurs the cutting rate is lowered by reducing the depth of cut until the excess coke is pumped away. When the coke is moderately hard the time required from the beginning of the boring until the drum is completely clean averages about 6½ hours. This corresponds to an overall coke removal rate of about 0.7 ton per minute.

When the drum is completely clean the transfer line and condensate line are inspected and cleaned if necessary, the steam-out valves are blasted with steam and the drum heads are replaced. After removing blinds and steam-testing, the drum is ready for heating prior to another 24 hours of coking service.

The coke-water slurry discharges onto an inclined chute the bottom of which is made of 6 mesh steel screen. The majority of the coke rolls down the screen while the water, together with all material below about 20 mesh, passes through the screen and down a solid chute to a temporary settling pond which is retained by a coke dike. A number of pipes are embedded in the dike and the water overflows through the pipes into a drainage ditch which leads to the secondary settling basin. The coke which rolls off the screen is moved by a bulldozer into piles from which it is loaded onto trucks.

This arrangement for separating the water from the coke is temporary. A permanent coke-water separating installation is under consideration which consists of a screen chute, a series of hoppers which can be used for loading trucks, and a primary settling basin which can be easily cleaned.

Presently,a loading crane is used to move the coke from the pile to the hauling trucks. The load is measured by weighing and delivered to the Great Lakes Carbon Corporation.

Two 500,000-gallon secondary settling basins have been provided to permit the deposit removal from one while the other is in settling service. These basins are located at each end of a 3,000,-000-gallon storage pond into which they overflow through submerged pipes. The pipes are so located as to leave both the settled and floating fines in the secondary settling basin. The relatively clean water from the storage pond is returned to a surge tank in the unit area by two vertical deep-well pumps. The jet pumps, the drum cooling water pumps, the sluice water, and the automatic make-up water to the coke-slurry pump suction pit are all supplied from the surge tank.

Operating Conditions and Yields

Presently the unit is charged with 700 SSF/122 straight run residuum from Wilmington Crude at a rate of 15,000 B/D which effects a recycle to fresh feed ratio of 0.31/1. The 20,000 B/D charged to the furnaces are heated to 920°F.

The bubble tower is operated to produce gasoline with an endpoint of 380°F, light gas oil with an endpoint of 650°F, and medium gas oil as necessary to maintain a level in the bubble tower bottom reservoir. No heavy gas oil is being removed. In the stripper tower the gas oils are stripped to a flash point which makes them suitable for use as cutter stock, although at the present time the light gas oil is used as TCC charge. Under the above operating conditions the following yields were obtained.

Operating Conditions and Yields

Operating Conditions	
Reduced Crude Charge	15,000 B/D
Furnace Charge	20,000 B/D
Recycle/Fresh Feed	0.33
Temperatures—Furnace Outlet	920°F
Drum Inlet	900°F
Drum Outlet	830°F
Drum Pressure	56#
Viscosity of Fresh Feed	700 SSF/122

Yields	
Total Gas	14.0 WT. %
Raw B-B	0.8 Liq. Vol. %
Debutanized Gasoline	22.5 " " "
Light Gas Oil	36.5 " " "
Medium Gas Oil	16.7 " " "
Coke (By difference)	19.1 WT. %

It is rather difficult to accurately determine coke yields because of various coke density but they can be roughly checked by means of the weighed haulings which approximate 500 tons per day. Samples obtained show approximately 0.25% ash, 9% volatile matter, and a screen analysis satisfactory for its intended use.

As would be expected with this type of process, the high sulfur Wilmington residuum charge yields a gasoline with an appreciable sulfur content. This sulfur content and the olefinic content of the gasoline are sufficient to require sweetening and rerunning. Motor method clear octane numbers in the neighborhood of 70 are obtained with an octane spread of eight or better. Lead susceptibility is fair and commensurate with the sulfur content.

Because of the desulfurizing characteristic of the TCC process, the coker gas oils have proven to be quite satisfactory as TCC charge stock despite their high sulfur contents. The 650°F endpoint light coker gas oil, when charged to the TCC units (bead catalyst) with a 1:1 recycle ratio, yielded 41% of 400°F endpoint debutanized gasoline. Furthermore, an octane level of 79 motor method clear and an octane spread of 10-12 points make this operation look attractive.

The low raw B-B yield is a result of the large gas yield from the bubble tower reflux accumulator which carries with it the bulk of the C_4 production. The total gas yield amounts to eight to nine million cubic feet per day. The dry gas after absorption amounts to some seven million cubic feet per day which is just double the requirements at the coking unit furnaces. The excess is used by other refinery units.

Our operating time has been far too short to establish the effects of operating variables. Nevertheless, some indication of their effect has been obtained. Increased viscosity of the charge appears to shift toward more gas and coke. Furnace outlet temperature changes through the range 910-920°F also had little effect on gas and gasoline yields; however, gas oil production increased with a decrease in coke yield. Reducing the recycle ratio shifted the yields from coke to the gas oil and lighter products.

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EMERGENCY LINES LIKELY TO REMAIN GAS CARRIERS

WASHINGTON.

THE coal strike, plus the vigorous probing of the House committee investigating surplus property disposal, seems to have put an end at long last to all the tail-spinning War Assets Administration has been long doing over disposition of the Big Inch and the Little Big Inch pipe lines. It looks now as though the big question—oil or gas—about which there has been so much fumbling and backstage play for more than a year, has been settled and that the two emergency lines are headed for eventual disposal for transporting natural gas.

Although the fuel crisis has subsided temporarily with the ending of the strike, the two lines will continue to carry Texas gas to the north and the east under the 120-day government lease to the Tennessee Gas and Transmission Company which runs through April 30. After that the future of the lines is indefinite. But the feeling is that with WAA's "complex" in favor of oil broken down they probably are in the gas business to stay, at least until another war emergency requires their use for oil.

Procedure for leasing the lines was set in motion the morning of December 2 by Secretary of Interior Krug in letters to WAA, custodian of the lines, and to the Federal Power Commission, which must license their interim use. Later in the day WAA cleared the way with a declaration of willingness to issue a permit to the Tennessee Gas and Transmission Company effective immediately through April 30. The letter of intent specified that the company must:

(1) Pay WAA at the rate of six cents per thousand cubic feet of gas.

(2) Assume all obligations and liability for operation and maintenance.

(3) Assume all the responsibilities of RFC and WAA under an existing maintenance contract with Williams Brothers.

(4) Restore the lines to their present condition at the end of the lease, and replace the inert gas that was in them if requested.

(5) Operation of the lines and transportation and disposal of the gas will be under the direction of the Interior Department or such other government agencies as the department may designate.

The letter specified that the interim lease would give the company no preference in ultimate disposal of the lines. The temporary rental of the lines was asked by Krug after WAA Administrator Robert M. Littlejohn had rejected all bids for outright purchase of the lines as surplus. Krug said that Interior had nothing to do with rejection of the bids. In his sudden announcement of the cancellation of all bids, Littlejohn said he would invite new bids on an "informal" basis, hoping for better offers. He had let it be known that he did not think the bids were high enough and that he did not feel that the lines could be legally sold to natural gas interests, in view of the recommendations of the Symington report which he believed binding.

However, in this connection some new light was thrown on the report and its meaning by WAA Economist J. S. Jenner before the House surplus property committee. Jenner disclosed that he was the author of the report to Congress which Littlejohn has been using as his text. The economist told the committee it was merely his unfortunate choice of words, not his intention, that gave WAA the impression the lines could be sold only for transporting oil.

The report issued in 1945 advocated sale to gas interests only if it were "impossible" to sell them to an oil company. Jenner told the committee that it was his unfortunate use of the word "impossible" that had given WAA the wrong idea. He merely meant that an oil company buyer was preferable, not mandatory.

The Tennessee company started trying to lease the lines back in September to supply gas to its customers in the Appalachian area. But its efforts were unsuccessful until the fuel shortage forced the government to grasp at any straw that offered a promise of relief. At top use under present conditions, the best that can be expected from the lines is around 150 million cubic feet a day, the equivalent of 6000 tons of coal.

Gas was turned into the Little Big Inch at Natchitoches, Louisiana, on the afternoon of December 5, and within a few days had reached outlets in the Columbus-Cincinnati area where distribution is being made through the Ohio Fuel Gas Company. Gas was turned into the Big Inch at Longview, Texas, December 9, seven days after the temporary contract was awarded.

The plan called for daily delivery of 50 million cubic feet daily through the Little Big Inch, the amount increased to from 100 to 110 million with the placing of the Big Inch in service, and another 50 million added as rapidly as the necessary connections were completed. Most of the gas is going to customers in Ohio, some to Indiana and possibly some in Pennsylvania.

According to Krug the government stands to make about a million dollars on the deal—$750,000 in rental plus $250,000 saved on maintenance. Testifying before the House surplus property committee, Ralph K. Davies, acting head of the Oil and Gas Division, revealed that WAA Administrator Littlejohn late in November asked for Krug's general views as to the policy that should govern the disposal of the pipe lines. In reply the Interior boss said:

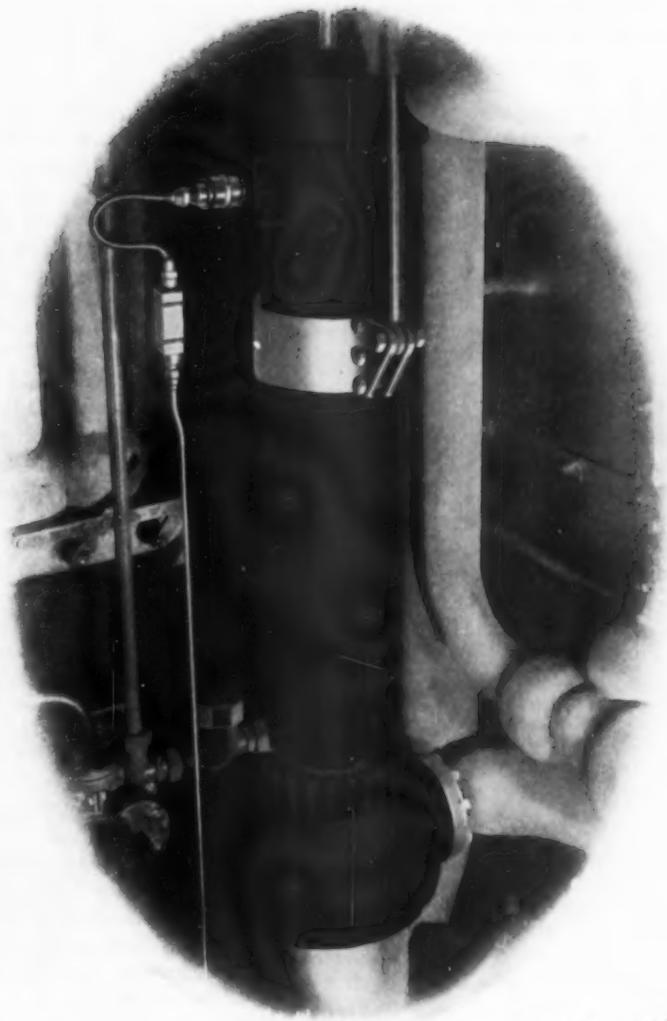
"The Department knows of no conservation end which would be furthered by use of the lines for the movement of either crude or its products nor of any other compelling reason for such use. On the other hand it is believed that a practical conservation measure of great significance could be accomplished by disposing of the lines for the transmission of natural gas under conditions designed to assure the gathering and use of the maximum practical quantity of natural gas which would be flared or otherwise wasted."

Davies summarized the department's views as to disposal of the lines: (1) That they should be sold for private operation; that they should not in peacetime be owned or operated by or on behalf of the government. (2) That they should be sold for gas service, but not for the transportation of oil. (3) That they should be sold on terms protecting the national safety. (4) That they should be sold on terms promoting the conservation of gas. (5) That they should be sold just as quickly as possible.

In advocating use of the lines for natural gas, Davies told the committee that it need not be taken for granted that the oil needs of the next war will be the same as those in the last one. It may well be, he said, that the next war will call for its maximum oil supply from a different source or delivered at a different point, or that water-borne or other means of transportation will better serve the purpose than the two big lines.

Davies pointed out the wisdom of using tankers in moving oil from the Gulf to eastern seaboard. He said oil could be moved as easily and at least as cheaply by tankers as by pipe line. For security reasons such movement by tankers should be encouraged, not discouraged, he said.

If another war should come, he told the committee, we may or may not need the Big Inch lines to carry oil and products from the Southwest to the Atlantic, but whatever the theatre of the war, unless new fuels and lubricants have supplanted oil, we shall need tankers. And if we need tankers, he said, we'll need trained and experienced tanker crews to operate them. In the last war, he reminded the committee, short as we were of tankers up to the final surrender, we were equally short of experienced men to man them. After all, he said, it would make little sense to seek a use for these pipe lines through junking part of our tanker fleet.



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OIL POLICY ESSENTIALS PUT BEFORE CONGRESS

By WILLIAM J. MADDOX
Chief, World Petroleum's Washington Bureau

IN its final report made early last summer but just recently turned loose by the House Foreign and Interstate Committee, PAW outlined six essentials of a national oil policy that are expected to be the basis for recommendations to the next session of Congress. Pointing to the growth of the nation's oil requirements and the decrease in the growth of its reserve capacity during the war years, Ralph K. Davies, acting head of the Oil and Gas Division, listed in his testimony before the committee the points he said were still necessary to assure an adequate supply of oil for the country. These are:

Development of domestic supplies; maintenance of a vigorous domestic industry; conservation of domestic resources; exploration of new areas including the continental shelf; development of synthetic liquid fuels; access to foreign oil.

On the subject of foreign oil supplies, Davies told the committee that imports can be expected to increase and that it is to the advantage of the United States to import oil rather than produce domestic fields in excess of efficient rates.

"Until a domestic reserve adequate for national defense is built up," he said, "it is vital that the United States have safe access to large volumes of foreign production. Our war experience has shown how important it is to have a strong position in foreign fields and to have American companies vigorously active abroad. Such a position can be maintained only on the basis of a sound foreign oil policy backed by understanding and aggressive public opinion."

Davies cited as two essentials of a sound foreign policy regarding oil equality of opportunity for American citizens and international fairness toward our nation. "The United States," he said, "should insist that its citizens deal fairly with the governments under which they operate and that these governments deal fairly with them."

Senate approval of the Anglo-American oil agreement, pledging the two countries to a recognition of fair play and cooperation in the orderly development of the international petroleum trade, was urged by the former deputy War Petroleum Administrator. He declared: "The pact represents but the first step, providing as it does an agreement on fundamental principles and an organized means for considering the problems of world oil. A practical approach has been made, and it is to be hoped that other producing and consuming nations will eventually join in the undertaking. By eliminating one of the causes of international discord, the treaty, I am confident, would make an important contribution to the preservation of the peace of the world."

As for the development of domestic supplies, Davies cited the advantage from the standpoint of national security of having within our own boundaries adequate supplies of natural petroleum. Without continued discovery and development, he said, our productive capacity normally declines about 300,000 barrels a day each year and at least that amount must be added annually to maintain our present position. He emphasized the need for additional reserve capacity to assure adequate oil for the nation's security.

To accomplish this, Davies said, the first requirement is to discover new oil supplies at much higher rates than have prevailed over the past few years. In the light of recent experience, there is no assurance that the discovery rate can be sufficiently increased to meet anticipated needs.

On the question of maintaining a vigorous domestic industry, he declared that the best reliance for accomplishing this is a strong and enterprising industry. "The incentives to find and develop oil must be such that the large and established companies will put forth their best efforts and the smaller companies may be encouraged to take the risks of exploration," he said. "Increases in all operating expenses undoubtedly make it cost more to find a barrel of oil today then in the years before the war. Capital will not be attracted to this business unless it offers an adequate return for the risks incurred."

Besides stimulating discoveries, Davies urged vigilance against waste of our resources of liquid fuels after they are discovered. Such practices as production above maximum efficient rates, gas wastage and other inefficient methods leave oil in the ground beyond recovery at reasonable prices, he explained.

"Eight oil-producing states have conservation laws that range in value from reasonably adequate to excellent and which are generally well enforced," Davies said. "Eleven other states have no adequate conservation statutes, California and Illinois being the largest of such producers.

"I believe in the control by each state of the resources within its borders. I should oppose any extension of federal authority to such resources unless all other means fail to prevent practices injurious to the national welfare and security and to the interest of other states. Such a situation puts a limit on the right of a state to do as it pleases with the resources that happen to lie within its boundaries."

Among the new areas to explore, Davies cited the new national domain, the continental shelf surrounding the water borders of the United States, aggregating 900,000 square miles, approximately 30 percent of the area of the continental United States. The cost of exploration of this entire area would be presently prohibitive for private capital, but the areas along the Gulf of Mexico and Pacific coasts appear to have potentialities for petroleum comparable to the adjacent land areas and are a long-range source which could be appropriately explored by government agencies, he said.

Davies described synthetic fuel production as a "second line of defense" to be employed if other measures did not result in an increase in domestic productive capacity to a safe level. The Bureau of Mines, he pointed out, has been experimenting with oil shales and coal, and with a great deal of information obtained concerning German synthetic fuel practices, the United States should advance rapidly in this branch of fuel technology.

For the time being, California Standard continues operating Navy's Elk Hills reserves under the terms of the wartime contract. The company had sought to have Navy modify the maintenance provision so as not to throw the full weight of the cost on Standard for keeping the field in a state of readiness for another war emergency, Navy paying 64 percent of the cost of the readiness program and the company 36 percent.

Secretary of the Navy Forrestal countered with a compromise that was almost the reverse, by which Standard would pay 68 percent and Navy 32 percent "from the date on which appropriations for the purpose are made available by the Congress" until the end of the so-called primary period of the contract.

After the primary period ends, according to Forrestal's proposal, the original 64 percent Navy-36 percent Standard ratio would govern. In return for making that amendment, Navy would expect the company to waive whatever rights it may have under the present contract, that is, the right to terminate the primary period by refusing to accept the oil produced.

Navy's proposed compromise proved unsatisfactory to the company and Standard rejected it, preferring to go along "as is" and defer seeking to amend the contract until some later time.

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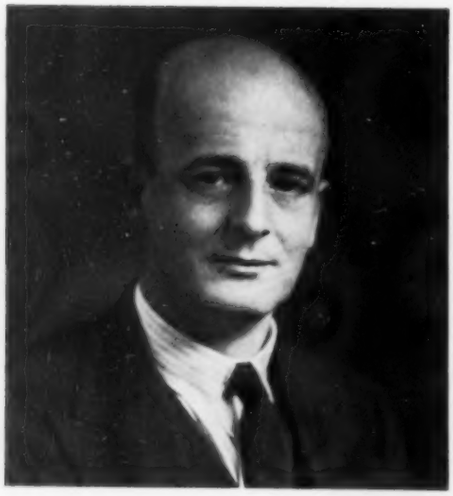
International News and Notes



H. E. Snow

H. E. SNOW has been appointed deputy director of the distribution department of Anglo Iranian Oil Company. He has been a member of this department since 1936, but his service with the Anglo Iranian group dates back to 1921 when he joined British Petroleum Company. In 1930 he was made a group manager. He was awarded the Order of the British Empire in 1946 in recognition of his services during the war as secretary of the Petroleum Board.

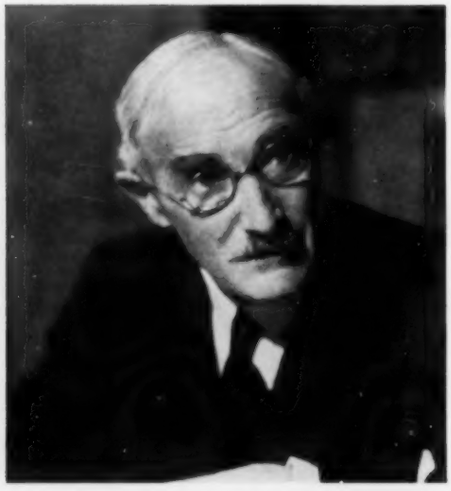
Attock Looks To New Fields

Discussing the position of Attock Oil Company, Ltd., which operates fields in the Punjab, India, area, Thomas Taylor McCreath, the company's chairman, stated recently that while output from Dublian, its chief producing area, continues to decline there is a hopeful prospect of substantial production from a new field at Balkassar. Tests of the first well drilled are encouraging and other test drilling is now being undertaken to determine the extent and productive potentialities of the field. The managers think well enough of it so that they have placed orders for some 34 miles of pipe for a line to provide a connection with their refinery.

At Joya Mair where production was found last year difficulties have been encountered because of the heavy nature of the oil. Exploration is being carried to lower strata and if this fails to produce results acid treatment may be applied to the sands previously located in an effort to make them flow more readily. The oil is suitable for asphalt production. A test well is also being drilled at Bokra but has not reached sufficient depth to determine results.

SIR JOHN BUCK LLOYD has resigned as managing director of Anglo Iranian Oil Co. His retirement comes after 27 years of active service with the company as managing director. In addition to his directorship in charge of finance and accounts, he was a director of a majority of the subsidiary and associated companies in the Angle Iranian group.

Sir John first joined Anglo-Persian (as then known) in 1909 to take charge of the new company's operations in Iran. He opened the first offices in Mohammerah (now Khorramshahr) and conducted negotiations for the site of the Abadan refinery. He returned to England in 1910 with enteric fever and on his recovery went to India where he remained as a partner



Sir John Buck Lloyd

in Shaw, Wallace and Co. until 1919 when he was elected managing director of Anglo Iranian. He received a knighthood from King George V in 1928.

Venezuelan Production

Production of crude oil in Venezuela for the month of September is reported as follows, in barrels of 42 gallons:

Company	West	East	Total
Creole	12,825,926	4,620,239	17,446,165
Mene Grande	1,682,865	3,800,698	5,483,563
Shell	8,757,205		8,757,205
Consolidada		719,022	719,022
Socony		795,855	795,855
Texas		120,187	120,187
BCO	32,246		32,246
Others	8,784	14,607	23,391
Total	23,307,026	10,070,608	33,377,634

Exports during the month included 22,130,999 barrels from the west and 8,166,829 barrels from the east, a total of 30,377,634 barrels.

Anglo-Iranian Production

Production of crude oil in Iran for the eight months ending August 31, 1946, is reported by Anglo-Iranian Oil Co., Ltd., as 89,068,000 barrels (12,724,000 tons). For the month of August the output was 10,815,000 barrels (1,545,000 tons).

Survey in Panama

Sinclair Panama Oil Corporation has sent a party of geologists to Panama to conduct surveys of the concession recently acquired in that country, preparatory to exploratory drilling. Headquarters of the company have been established in Panama City.

Colombian Strike Settled

Following the decision of a Labor Court judge in Colombia declaring the strike of Tropical Oil Company workers illegal and directing that the points in dispute be referred to an arbitration board, a settlement was arrived at by that means. Wage increases ranging from three percent to 18 percent were granted along with certain minor concessions that had been asked for. Similar adjustments are expected to be made in the case of other companies operating in Colombia. Evidence presented to the arbitrators showed that oil company employes received higher pay than any other class of workers in the country.

J. A. CLARK, vice president of Creole Petroleum Corporation, has resigned to become executive assistant in the office of the coordinator of foreign and domestic production of the Standard Oil Company (N. J.) Mr. Clark has been with Jersey Standard and its affiliated companies for more than 23 years, the greater part of this time have been spent with Creole in Venezuela.

R. H. Sherman, a vice president and director, will assume the duties formerly assigned to Mr. Clark as Coordinator of Operations of the Creole Petroleum Corporation in the New York office. Mr. Sherman recently arrived from Venezuela where he spent the last thirteen years directing Creole's geological activities. Mr. Sherman has been associated with the Creole Petroleum Corporation and other affiliated companies of the Standard Oil Company (N. J.) for more than eighteen years.

Visitors To U. S.

H. A. Metzger, president of Standard Oil Company, S. A. of Argentina and general manager of the companies that constitute the Esso group in that country, arrived recently in the United States, accompanied by Dr. Ernesto Gallacher, head of the legal department and vice president of the company.

The President of Standard of Argentina was born in New York in 1900, and received his degree as Mechanical Engineer from Cornell University in 1921. In August of the same year he joined the International Petroleum Company, affiliate of Jersey Standard and was assigned to Colombian oilfields. He served in various capacities for Tropical Oil Company and Andian National Corporation and was their representative in Bogota from 1928 to 1936. From 1937 to 1944 he represented Standard Oil Co. (N. J.) in various parts of South America, assuming the management of Standard's Argentine interests in 1944.

Dr. Gallacher was born in the city of Rosario Pcia, Argentina, and received his law degree in 1927. In 1928 he joined the West India Oil Company and in 1935 was appointed to the legal department of the company, being promoted to chief of the department during the same year. From 1935 to 1941 he was president of Cia de Petroleos La Republica and in 1942 he was made vice president and a director of the West India Oil Co., a post which he still holds.

H. A. Metzger

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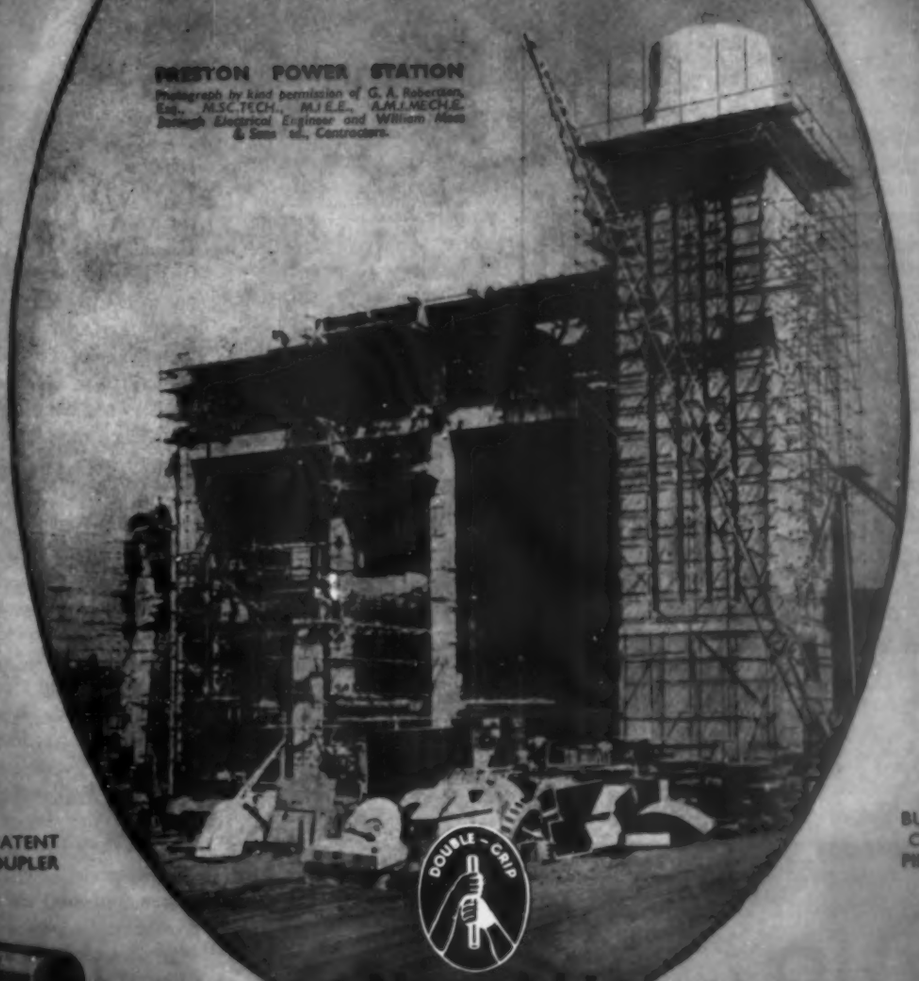

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OIL SHARES GROW IN FAVOR WITH INVESTORS

THE investing public currently places greater value on oil securities relative to stocks generally than it did in 1934. Over the past thirteen years there apparently has been a gradual, but occasionally interrupted, revision of opinion on oil shares among purchasers of common stocks, as compared with all stocks. The result has been that the net gain in market value of equities of petroleum companies since 1933 has been greater than that for the Dow Jones average of industrial stocks.

There were periods in the past thireen years when market values for common stocks of oil companies lagged behind a rising market, but over the longer terms the outstanding investment qualities of the industry have come to the front. Factors influencing investors in this change in attitude are the growth inherent in the oil industry, prospects for greater earnings, conservative financial policies and the amount of information regarding the favorable aspects of the industry which is brought to the attention of the public.

Chief among the factors giving rise to higher relative values for oil stocks has been the reaffirmation of the growth trend which still exists in the industry. This was vividly illustrated in 1946 when the expected decline in demand from the wartime peak did not materialize. Basically the growth in the oil industry has been derived from the expansion in motor transport and competitive gains in its use as a fuel. During the ten years 1936 through 1945 production showed steady annual increases with but a minor interruption in 1938 resulting from the business recession and a slightly sharper reaction in 1942 because of economic dislocations incident to the war. Oil's growth in favor as a fuel is indicated by its increased use for power by the railroads. In 1940 only one-tenth percent of freight ton-miles was registered by oil-burning equipment, while in the first eight months of 1946, 12.1 percent of freight ton-miles were hauled by oil-fueled engines. Comparable percentages for passenger and switching miles increased from 6.7 percent to 20.4 percent and from 10.2 percent to 32.9 percent respectively.

Many other factors, of which prices for crude oil and refined products and policies relative to the financing of expansion are of primary importance, govern the trend of stock prices. Of greater interest to the investor than the growth in physical volume of production is the effect of expansion on earning power. At times an unfavorable price structure within the industry has prevented the increase in demand for oil from being reflected fully in higher earnings. However, periods of low prices have been temporary factors and over the longer term the expansion in the industry has been reflected in higher net income. As measured by the total net income of 20 oil companies in 1945 earnings were 48.7 percent above the 1936 level while industry in general (represented by 381 companies) showed an increase of 18.2 percent.

Conservative financial policies in the industry have contributed to the realization of higher earnings as a result of the growth in demand for petroleum products. Less than 10 percent of the capital needed to find, produce and refine the greater quantity of oil and to provide facilities for the many new chemical products derived from oil has been provided by the raising of new capital in the investment market. Consequently, additions to capital charges senior to the common stocks and dilution of equities of oil companies have been small. In most cases refinancing of old debt has offset completely the effect of increased debt upon earnings.

Expansion in producing, transportation, refining and marketing properties has been accomplished almost entirely by plowing back into the companies a substantial portion of earnings each year. Based on the combined income statements of the 28 largest domestic oil companies, dividends paid on the common stocks in all of the last ten years except 1938 have averaged less than 58 percent of income available for dividends and in six years have averaged less than 50 percent. The net result of this conservative dividend policy has been that common stockholders have shared almost 100 percent in earnings from the industry's growth.

While growth determines the long-term performance of oil stocks, short term fluctuations are closely tied to current earnings and the price structure within the industry. Market prices for shares of petroleum companies lagged behind the general market from about mid-1938 until the end of 1940; a time when prices for oil and its products declined along with all commodities but failed to turn upward when other prices began to improve in 1939. It was not until 1940 that the price structure in the oil industry began to rise. The advance in prices in the petroleum industry had not caught up with the general price level when the OPA placed ceilings on all petroleum prices. The gap between oil prices and the general price level was not eliminated until the industry was relieved from price control in the summer of 1946.

Changes in price structure can affect individual companies differently depending upon the nature of their operations. Market prices for stocks of companies engaged primarily in the production and sale of crude oil are most sensitive to fluctuations in oil prices. Shares of producing companies showed the greatest rise in the periods 1934 to 1937 and 1942 to 1946. However, they also registered the largest decline from the peak in 1937 to their low in 1940. Refining companies (purchasers of a substantial portion of their crude oil requirements) do not always act the same as producing companies because their earnings are dependent largely upon the spread between crude oil prices and prices for refined products, and the movement of crude and refined prices is not always identical. Equity securities of integrated companies are the most stable in the market because they are best equipped to meet changes in both crude prices and prices for products.

Complete understanding of the movement of oil stocks requires a knowledge of the sentiments of

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The above article was prepared especially for WORLD PETROLEUM *by the Securities Research Department of Merrill, Lynch, Pierce, Fenner & Beane.*

TABLE I

Earnings and Dividends of 28 Leading Oil Companies

Year	Net Available for Common stock (Thousands of Dollars)	Common Dividends (Thousands of Dollars)	Percent Income Paid to Common Stockholders
1936	$417,500	$218,300	52.3%
1937	593,300	287,900	48.5
1938	315,300	197,400	62.6
1939	328,000	188,000	57.3
1940	381,400	209,100	54.8
1941	539,700	253,000	46.9
1942	493,800	223,400	45.2
1943	528,700	247,900	46.9
1944	684,600	297,900	43.5
1945	636,700	299,500	47.0

the investing public. The low values for oil shares in the 1938-1942 period were not only caused by the unsatisfactory prices for crude oil and refined products but also were due to the public attitude toward the future of the oil industry. While the public felt that there was future growth for the industry, it also believed that earnings would not reflect that growth. At that time it was generally considered that excessive competition would prevent any substantial increase in earnings. Investors believed that production facilities for both crude oil and refined products were far ahead of demand and that cutthroat competition might keep earnings in the industry at a low level. The war showed the fallacy of this attitude and at the present time the belief that this country will run out of oil is not uncommon among purchasers of equity securities.

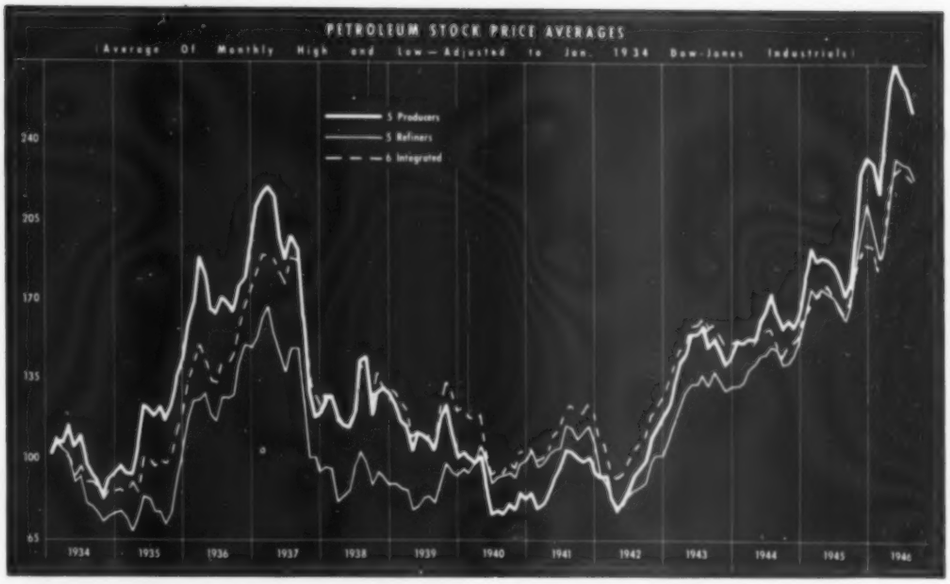
This change in the public's appraisal of the industry from one of overabundance of supply to one of adequacy at best indicates a belief that a satisfactory price structure will continue in the industry. An additional factor which applies especially to stocks of producing companies is the acceptance of oil shares as a hedge against inflation. This idea is only an important influence in the stock market during periods of inflation scares. The better than average performance of oil shares from 1935 to 1937 and during the war was in part caused by the buying of common stocks of oil companies as an inflation hedge.

Conditions appear satisfactory for the continuation of a better than average market performance

TABLE II

Comparative Net Income of Petroleum and General Industrial Companies After Taxes and Reserves

Year	Petroleum (Millions of Dollars)	Industrials (Millions of Dollars)	Petroleum Percent of 1936	Industrials Percent of 1936
1936	$434.2	$2,453.2	100.0	100.0
1937	600.7	2,683.1	138.3	109.4
1938	318.4	1,428.3	73.3	58.2
1939	336.4	2,217.1	77.5	90.4
1940	391.8	2,662.8	90.2	108.5
1941	545.3	3,101.2	125.6	126.4
1942	414.5	2,543.8	95.5	103.7
1943	532.8	2,688.3	122.7	109.6
1944	670.0	2,889.0	154.3	117.8
1945	645.5	2,899.5	148.7	118.2



of oil shares over the long term. All sections of the industry are agreed on the future growth in demand for oil products. The industry is in a strong position to meet the needs of expansion and there are indications that the investor may expect larger dividends in the future. The price structure within the industry has improved sharply and this gives greater assurance to the expectation that sufficient new reserves of crude oil will be found. Expansion and increased earnings do not end with the good outlook for crude oil and its products. The industry's constantly expanding activities in the field of chemicals and the increasing value of natural gas, the bulk of which is held by the oil industry, are further reasons for believing that the oil industry is an excellent vehicle for long-term investment.

As these factors governing the future investment value of the industry become more evident, the appraisal of oil shares in the stock markets should be raised. Because general investor sentiment is an important factor in the determination of market price, the industry's proposed public relations program undoubtedly will bring the favorable investment qualities of the industry into sharper focus. Oil shares have performed most favorably in the market at times when the economic importance and the future prospects of the industry were clearly evident.

MID-EAST DEVELOPMENTS

IN international trade circles, chief interest during the past month has centered on pending agreements affecting the future of Middle East oil. While these undertakings are being arrived at independently, they all are recognized as having a definite bearing on the marketing of oil produced in that part of the world.

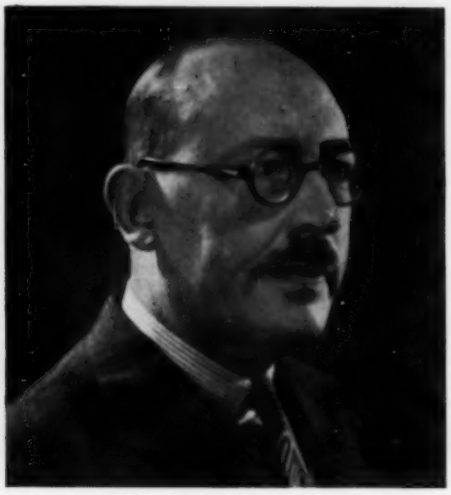
Particular importance was attached to the announcement that Standard Oil Company (N.J.) and Socony-Vacuum Oil Company had acquired a substantial minority interest in Arabian-American Oil Company, heretofore jointly owned by Standard Oil Company of California and The Texas Company. According to statements issued by Jersey Standard and Socony-Vacuum, the former will purchase a 30 percent interest and the latter a 10 percent interest in Arabian-American and will share proportionately in the cost of the projected Trans-Arabian pipeline which is to extend from the Persian Gulf to the eastern shore of the Mediterranean. The announcements state that final conclusion of the agreement awaits the completion of current surveys and discussions.

It was also made known that Standard Oil Co. (N.J.) and Socony-Vacuum Oil Co. had concluded a preliminary agreement with Anglo-Iranian Oil Co. Ltd. to purchase "substantial" quantities of Anglo-Iranian production over a period of the next twenty years. Both transactions are explained by the two American companies as designed gradually to bring supplies for their Eastern Hemisphere markets into balance with the anticipated increase in demand.

A third arrangement which is stated to have been under consideration for a considerable time is the purchase by California Texas Oil Company, Ltd., of marketing facilities in Europe and Northern Africa formerly owned by The Texas Company. California Texas is a marketing organization and is a subsidiary of Bahrein Petroleum Co. Ltd., which in turn is owned jointly by Standard of California and The Texas Company. Heretofore its operations have been confined to territory east of Suez. Extension of its markets westward is expected to provide outlets for increased production of Arabian petroleum.

OIL COMPANY STAFF CHANGES

M. J. Heald



E. H. O. Elkington

M. J. HEALD now is Oklahoma-Kansas division manager for the producing department of The Texas Company with headquarters at Tulsa. He stepped up to this position on October 1 when H. N. Pardee retired. Mr. Heald has been assistant division manager since March 1938 when he was transferred from the Rocky Mountain area.

Merl Heald was born on a lease at Shamburg, Pennsylvania, June 26, 1886, and started his oil career as a roustabout in the summer of 1902 during school vacation. After completing college in 1909, he engaged in the drilling, contracting and producing business.

He joined The Texas Company as district superintendent in charge of its early exploration development in Carlsbad, New Mexico area in 1927 and subsequently served in various Texas divisions. In March 1936, he was promoted to general superintendent of the company's Rocky Mountain division at Denver, and in 1937 was promoted to assistant division manager.

ROSS FLOYD, one of the founders of the Future Farmers of America and for many years a vocational agricultural specialist, has been appointed agricultural service manager for Continental Oil Co. He now is in charge of Continental's service to those engaged in farming and stock raising and will stress promotion of farm youth activities.

BRINTON C. WENTZ has been named proration engineer for Continental Oil Company. He has been assistant to Charles R. Allen who was recently made California region manager of Continental's production department.

H. S. M. BURNS who has been associated with the Shell organization for more than 20 years, has been named senior vice-president of the Shell Oil Company, Inc., in the East of Rockies territory. Starting as a geophysicist with Shell's exploration department in California, Burns progressed rapidly through positions of increasing responsibility in the manufacturing and marketing departments there. In the latter department, he served as division manager and later as general sales manager. Since 1935, he has spent most of his time in Colombia, where he organized and directed Shell's exploration and production activities.

E. H. O. ELKINGTON has been appointed deputy director of production for Anglo Iranian Oil Company. He has been a member of the head office managerial staff since 1937. Before that he was manager in Iran for nine years, having been appointed to that post when Mr. Jameson was called to London as general manager of the production department and deputy director. Mr. Elkington first joined the company in 1921 although he had been associated with Iran and India since 1910.

CHARLES R. ALLEN, formerly proration engineer for Continental Oil Company, Ponca City, has been appointed California region manager of the company's production department, with headquarters in Los Angeles. He has been with Continental for the past 23 years. His appointment follows the retirement on Dec. 1 of R. E. Collom, vice president, who has been in charge of Continental's California production operations for the past 15 years. Mr. Collom will continue to serve as the company's director of the important Kettleman North Dome Association.

Roy Collom is well known to the oil fraternity throughout the United States, having served the industry for more than 30 years. He started his career in the oil business by going to work in the Coalinga, California, oil fields for the Esperanza Oil & Gas Company. In 1923, Mr. Collom was employed by the Coast Land Company, Los Angeles, a subsidiary of the former Marland Oil Company, as chief geologist, and at the time of the Continental-Marland merger in 1929, he was executive vice president of the Marland Oil Company of California.

Following the merger, Mr. Collom became manager of the California division of Continental Oil Company, and was named assistant to the president in December 1932, succeeding to his position as vice president in May, 1934.

PRODUCTION and exploration activities of Shell Oil Co. east of the Rockies are being divided into four major areas whose work will continue to be coordinated from Houston. The Tulsa area will continue under R. B. Roark, vice president and manager, and the following new appointments have been made: W. A. Alexander, manager of the Houston area; B. Dykstra, manager of the Midland area; and E. G. Robinson, manager of the New Orleans area.

W. A. Alexander joined Shell in 1928 as district field engineer at White Castle, La., and became assistant production manager in 1942. In 1944 he became manager of the production department in Houston.

E. G. Robinson began his career with Shell in February, 1925, as district geologist at San Antonio. Subsequently he filled positions in almost every division and in December, 1943, was appointed exploration manager of the Texas-Gulf area.

B. Dykstra has been with Shell since 1926 and has held various positions in the Gulf Coast until 1936, when he was transferred to Tulsa as chief exploitation engineer, remaining in that position until he was transferred to California in 1939. He left California in August of 1940 to accept a position with Shell of Colombia in South America, and his last assignment there was that of technical manager.

HARRY R. CARPENTER, well-known in the oil fields of Oklahoma, Kansas and Texas because of his thirty-three years of employment in the industry, has become special sales representative of The National Supply Company in the midwest division. Mr. Carpenter was formerly division manager of the Jarecki Manufacturing Company. His office will continue to be in Bartlesville, Okla., where he has made his headquarters since 1915.

R. E. Collom

Charles R. Allen

H. H. Glen, Pres. C. L. Lamkin, V. Pres.

Paul Courtney J. T. Tucker

Emsco Staff Promotions

Mr. C. L. Lamkin, vice president of the Emsco Derrick & Equipment Company, has been moved from the Houston plant, where he served at plant manager, to the main Emsco offices at Los Angeles. In his new position, Mr. Lamkin will concern himself with all phases of the company's business from the standpoint of management.

Mr. Paul Courtney, formerly sales manager of the Houston branch, has been appointed manager of the Houston plant to succeed Mr. Lamkin. His position as Houston sales manager has been filled by Mr. J. T. Tucker, who previously served as field service manager for the Emsco Derrick & Equipment Company in the Mid-Continent area.

Steel Castings Booklet

Hadfields, Ltd., Sheffield, England, has published a 20-page book describing the large and complicated steel castings which the company manufactures. Photographs are shown of autoclaves, digesters and other special vessels manufactured for oil and chemical industries from corrosion-resisting steels; sprockets, pulleys and guides for oil-well drilling rigs and other castings weighing up to 25 and 30 tons.

Continental's Two New Fields

Opening of a new oil field was announced early in December by Continental Oil Company following completion of G. R. Smith No. 1 about 12 miles southwest of Medicine Lodge, Kansas. The well flowed 50 barrels of 27 gravity oil per hour on test, with gas at the rate of one million feet per day.

This was the second field opened by Continental within a week, the earlier discovery attending the completion of the wildcat Margaret Smith No. 1, near Elk Springs, Colorado, 28 miles northeast of the Rangely field. This well made 200 barrels of 30 gravity oil on a 24-hour test in the Weber sand at 6,097 to 6,126 feet. Continental, in partnership with Kennecott Copper Corporation, has a block of 2,164 acres in this new field.

CHESTER F. SMITH, a director of Standard Oil Company (N. J.) and for more than 35 years associated with the company in manufacturing and engineering operations, was named a vice president on December 1. Since 1944 Mr. Smith has been chairman of the company's coordination committee, a central study and advisory group for the managements of companies in the Jersey group.

Created some years ago as another step in decentralization of Jersey management, the committee now headed by Mr. Smith meets regularly to review such matters as quality of products, producing and refining techniques, supply and demand outlooks. Working with the committee as a whole in its long-range planning are sub-committees of executives and department heads who report on trends in domestic and foreign operations and a chemical policy committee to review research and development.

The appointment of Mr. Smith increases the number of vice presidents of Standard Oil Company (N. J.) to four. The others are Orville Harden, John R. Suman and Robert T. Haslam, all of whom are also directors of the company.

From 1940 until his appointment as a director in 1944, Mr. Smith was president of Standard Oil Company of New Jersey, the principal refining and marketing subsidiary of the parent company. After various assignments, Mr. Smith was appointed assistant to the general superintendent of the Bayonne refinery in 1922 manager. He was appointed manager of the Bayonne plant in 1928 and in 1931 became assistant general and four years later was made the refinery's general manager of the company's three New Jersey refineries. From 1933 until 1940, he was vice president of the operating company and general manager in charge of its refineries.

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Badger Organization Expands

In line with the expanding activities of the oil industry, both in the United States and abroad, the well known engineering firm of E. B. Badger & Sons Co., with offices in Boston, New York and San Francisco, is extending its facilities for serving the petroleum, petro-chemical and chemical industries.

Included in these developments is re-establishment of the London office of E. B. Badger & Sons (Great Britain) Ltd., with J. T. T. Robinson as director and general manager. A Brazilian company has been organized under the name of Badger Servicos Tecnicos de Engenharia S. A. with headquarters in Rio de Janeiro. Its officers are Dr. Roger H. Newton, director-president, Ernest V. Owen, technical director, and Dr. Eduardo Guinle Filho, financial director.

Fluor-Lewis and Company, recently organized by J. S. Fluor and Milton Lewis, has been appointed Badger representative for the western United States with offices in Los Angeles.

Visit Southern Properties

Eleven directors of Standard Oil Company (Indiana) left Chicago by company plane late in November on a five-day trip of inspection of subsidiary properties in Texas and Louisiana. They visited production-subsidiary offices at Houston, Tex., and oil fields in that vicinity, the Pan American Refining Corporation refinery at Texas City, Tex., and the Pan American Petroleum Corporation headquarters at New Orleans, La., and refinery at Destrehan, La.

In the party were Dr. Robert E. Wilson, chairman of the board; A. W. Peake, president; Dr. Max G. Paulus, vice president in charge of manufacturing; Harry F. Glair, general manager of manufacturing; Roy F. McConnell, vice president in charge of sales; Bruce K. Brown, vice president in charge of development; Buell F. Jones, vice president and general counsel; H. E. Hanson, general manager of sales; L. C. Welch, general manager of the lubricating and sales technical services department; Frank O. Prior, vice president in charge of production; and R. J. Lindquist, financial vice president.

Pell W. Foster, Jr.

Heads Foster Wheeler Production

Pell W. Foster, Jr., vice-president and director of the Foster Wheeler Corporation, has been appointed vice-president in charge of production. He has been associated with the company for 27 years, was elected a vice-president in 1942 and a member of the board of directors in 1938.

BASIL L. EMERY has been elected vice president in charge of domestic and foreign sales and advertising for Chesebrough Manufacturing Company. Frank McGroarty has been appointed secretary, and the company appointments include Edwin F. Weigand to domestic sales manager; Allison B. Hart to manager, foreign department; and Albert B. Richardson to advertising manager.

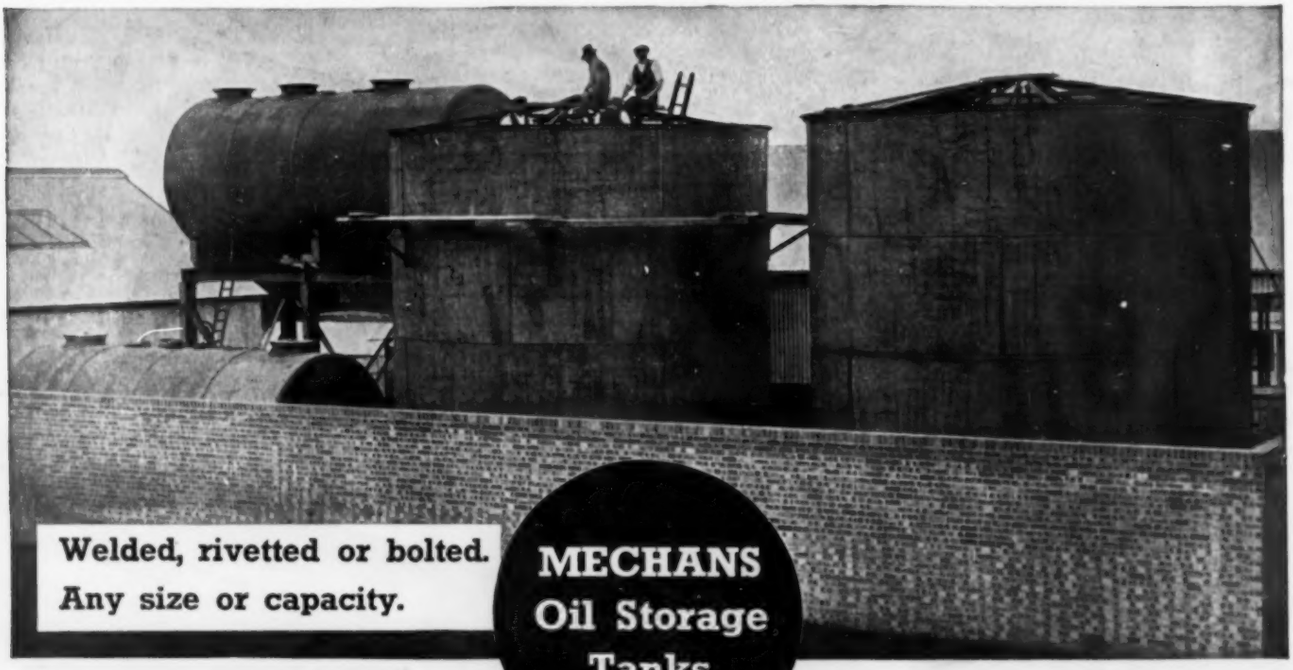
Six new executive appointments have been made at the Perth Amboy, N. J., plant. They are: Hans J. Miller to general superintendent; James S. Holton to superintendent of packaging and shipping; Carl S. Pennington to chief engineer; Matthew J. Farnen to chief accountant; George Hawley, Jr., to superintendent of refining division; and Martin Ganzler, Jr., as director of Perth Amboy plant research.

Alex K. Jensen, former Chesebrough export manager, has been granted a leave of absence because of illness. He will continue as a director. Richard M. Mack, former superintendent of Perth Amboy plant also will tage a leave of absence until June 30, 1947, at which time he will retire.

Cancels Suit On Unit Operation

A decision of interest to oil men and companies participating in unit operations was rendered recently by the Tax Court in Washington. The case was one affecting 20-odd interest owners in the East Alice field in Texas. On a notice of deficiency issued by the Dallas Tax Court, it was held that the producing association was liable for taxes on the same basis as a corporation. In a review by high officials of the Bureau of Internal Revenue, however, it was decided that the Bureau should not depart from its long-established rule against taxing unit operations or associations, and the prosecution was dropped.

ILLUSTRATION SHOWS TANKS DURING ERECTION AT OIL SERVICE STATION



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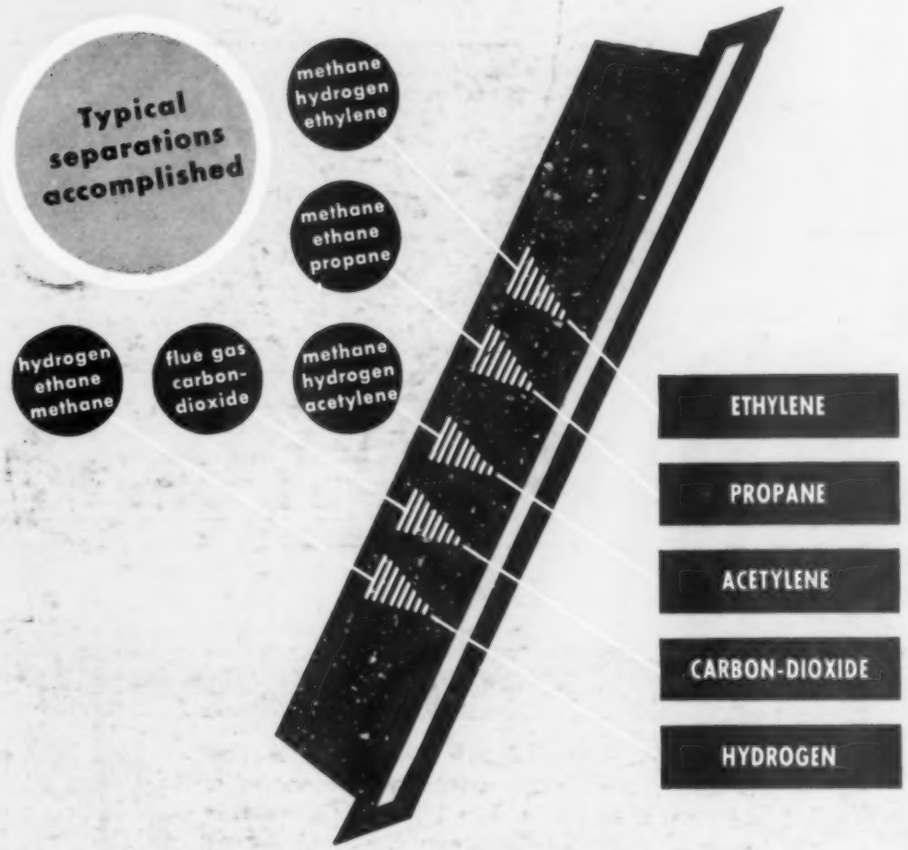
hypersorption



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hypersorption

This Hypersorption column is shown under construction at our Carteret, New Jersey works. It will be erected at the Midland, Michigan plant of the Dow Chemical Company. • The photographic view is from the top down, showing (a) the cooling section, (b) the charge and product manifolds and (c) the heating section. The heat is supplied by a Dowtherm vapor heating system. • A complete technical description of the Hypersorption process is presented in a reprint from the Trans. A.I.Ch.E. (August 1946) titled "Hypersorption Process for Separation of Light Gases" by Clyde Berg, Research Department, Union Oil Company of California.

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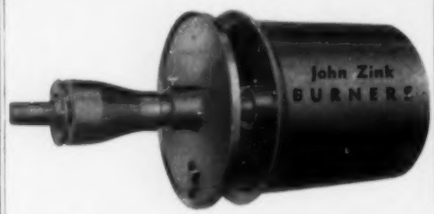

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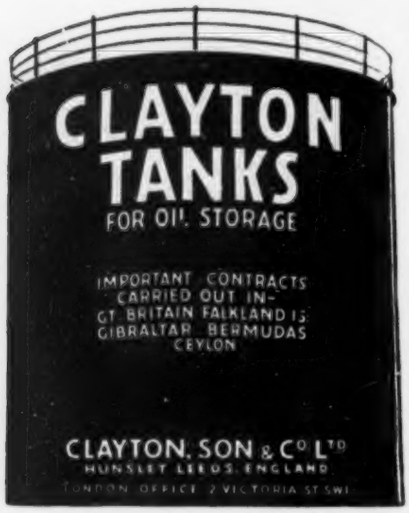

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New Powerful X-Ray Machine

An important advance in the X-ray testing of iron and alloy parts of heavy machinery and heavy steel work in general has been taken in the construction of a 20 million-electron-volt betatron built by Allis Chalmers Corporation, for the U. S. Arsenal at Picatinny, N. J., where it is now in daily use.

The main point about this new betatron is that the X-ray it produces will serve for the inspection of specimens of various alloys with a range of thickness of between 4 inches and 18 inches or more which it has been impossible to do with the X-ray machines heretofore available. Copper alloys may also be inspected. Perhaps of even greater importance than the ability to see that far into a mass of metal is the rapidity with which the work of inspection can be accomplished. The operation of inspecting a heavy casting for internal flows is now only a matter of a few minutes, so that instead of testing one piece out of ten, every article or foot of pipe produced in a shop may be inspected on a production-line basis. In a recent demonstration at Picatinny Arsenal shells and rocket war heads were thoroughly inspected in a continuous 8-hour sequence; 60 10-inch shells can be inspected in an hour. More bulky objects may be moved in front of the machine by an overhead crane or a fork truck. Flaws from 1/32 to 1/10 of an inch in diameter are readily detected and the safety of forgings, castings, welds, valves and other critical parts of large dimensions can now be assured.

As in any roentgen apparatus, the betatron radiation is produced by the impact of electrons on a metal target. The chief difference lies in the method of accelerating the electrons. In the conventional equipment, the electrons are accelerated by the application of large voltages between electrodes; in the betatron the energy of the electrons is derived as in an electrical transformer, from the accelerating effect of an increasing magnetic field.

In the 20-million-volt betatron the electrons circulate in a doughnut-shaped vacuum tube about 300,000 times in one-fourth of an electrical cycle, gaining 70 electron volts per revolution. They are then brought by magnetic deflection against the metal target. The process is repeated in each electrical cycle. In this way, in the standard 20 mev machine, 180 bursts of x-rays are produced each second. At 20 million volts, the efficiency of x-ray production is very high and the x-rays proceed mainly in the direction in which the electrons were travelling upon impact.

Aside from its industrial uses, the betatron has attracted large attention from medical men as a possible means for the therapy of deep seated cancer and other conditions that cannot be effectively reached by the x-ray machines now in use.

New Series of Booklets

Patterson-Ballagh Division of Byron Jackson Co. has published a series of booklets giving information specifications, installation instructions, parts and price lists of oil field specialties they manufacture. These booklets are in addition to the 1947 General Catalog which also is now ready.

The new free booklets may be ordered by number as follows: Plastic Tubing Protectors, Booklet No. 180; Mud Guns, No. 200; Pipe Wipers, No. 300; Sucker Rod Wipers, No. 310; Kelly Wipers, No. 320; Wire Line Wipers, No. 330; Deep Well Swabs, No. 340; Wire Line Guides, No. 400; Dead-Line Stabilizers, No. 500; Traveling Block Bumpers, No. 600; Swivel Ball Bumpers, No. 650; Protectors, Stabilizers, Tools and other items, General Catalog 1947.

Turns To Tank Building

Since the close of the war, Sun Shipbuilding & Dry Dock Co. has been building high-pressure and lightweight tankage as well as refinery equipment and tankers. The company now is working on an order for 89 30,000-gallon propane tanks. Smallest tanks being produced are for service station storage.

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New Petroleum Chief States Mexico's Policy

(Continued from page 43)

said to involve 15,000 pesos, as these leaders insist that the balanced pay be retroactive from last July 1. Information is that the oil workers union is opposed to sitdown strikes or a general strike, but that sections one and 33 are determined to take such measures unless they get the demanded wage balancing. Pemex is hopeful that the Muñoz committee will calm those sections.

Lic. Andres Serra Rojas, the new Labor Minister, has given Pemex and other employers who have vexing work problems, encouragement with the announcement that he intends, in accordance with President Aleman's program of progress and tranquility through steady work and increased production, to suppress all illegal sitdown and other strikes. The Minister is holding conferences with oil union leaders with a view to attaining peace in the petroleum industry. Serra Rojas has said that he is determined to apply the law in all cases of labor unruliness and not be hesitant nor wavering in doing so.

Pemex has had to increase the price of gasoline, but consumers have accepted the higher quotation without much protest, though complaints continue about inadequate distribution in many parts of Mexico. Pemex is operating tank trucks along the trunk highway between Mexico City and the eastern Texas border, a section of the Pan American Highway, so that American and other motor tourists will neither be stranded nor embarrassed. Pemex is one of Mexico's prime champions of attracting, keeping and increasing tourist trade, particularly American, which is calculated to be on its way to being worth 600,000,000 pesos a year to Mexico, though some important Mexico City newspapers see this business wavering and starting to drop, because, they say, of flagrant profiteering by caterers and the hostility of an element of Mexicans to foreigners, particularly Americans. Pemex operates an efficient tourist bureau, for Mexicans and foreigners. This bureau, it is said, is an important factor in attaining the progressive increase in home market sales to which Pemex points with pride.

While no official statement nor indication about 1946 production has yet been made, it is expected that the yield will be around 40,000,000 bbls.

Pemex has just published a balance sheet covering 1946 up to August 31 and a comparison with the general balance as of December 31, 1945, both reports approved by Efrain Buenrostro, company director general, up to last November 30. The report points to an increase in special reserves and remarks that they have strengthened Pemex's financial situation. It says the statement of Pemex's financial situation was made under the supervision of certified public accountants and to a date as close as possible to November 30, when ended the six-year term of President Avila Camacho. Tomas Vilchis and Alfonso Ochoa Ravize, certified public accountants, signed the report, which is detailed in the accompanying tabulation, amounts in pesos.

New Book

Petroleum Production, Vo. 2. The Optimum Rate of Production, by Park J. Jones, consulting engineer, published 1946 by Reinhold Publishing Corporation, New York, 293 pages, $4.50.

The first volume of this series has already appeared under the title: The Mechanics of Production. The present volume goes searchingly into what is the maximum efficient rate of oil production, with special reference to reserves, the capacity of reservoirs for production, the economic limits of wells and reservoirs, rates of depletion and their optima, and the selection of optimum producing and operating methods in consideration of questions of number and location of wells, gas and water injection. The whole subject of optima for particular leases and reservoirs is discussed from various angles in the light of modern concepts of reservoir behavior.

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And it could well apply to you,
If it is OIL you seek.
A Gravimetric Survey
I'm told is hard to beat.
They say, too, that Mayes-Bevan
Is really on the beam
With Gravimetric Surveys
They've a mighty sweet routine.
MAYES-BEVAN
GRAVITY METER
M
B
SURVEYS
COMPANY
KENNEDY BLDG.
TULSA, OKLAHOMA

Stanley C. Hope

STANLEY C. HOPE, president of Gilbert & Barker Manufacturing Company, of Springfield, Mass., also was elected president of Stanco Incorporated at the annual meeting of the Stanco board of directors. Both companies are affiliates of Standard Oil Company (New Jersey).

Stanco Incorporated manufactures specialty products such as Flit, Mistol and other petroleum specialties, and through its subsidiary, Daggett & Ramsdell, makes and markets cosmetics. Gilbert & Barker manufactures oil burners, gasoline dispensing pumps and similar devices.

Mr. Hope succeeds F. W. Moss, who had planned to retire at the end of this year but who has agreed to continue for another year in an advisory capacity on Stanco's foreign marketing activities.

HIRAM M. DOW of Dowell, N. Mex., has been elected chairman of the Interstate Oil Compact Commission for the coming year. He succeeds Gov. Robert S. Kerr, of Oklahoma. Mr. Dow is a former Lieutenant Governor of New Mexico and served during the war as chairman of the national conference of petroleum regulatory authorities.

Other officers elected include Clarence P. Smith of Flora, Ill., vice chairman; Warwick M. Downing, Denver, Colo., second vice chairman; Earl Foster, Oklahoma City, executive secretary.

ROLAND WHEALY has been appointed general refinery superintendent for Ashland Oil & Refining Co., Ashland, Ky. He has been acting refinery general superintendent since the resignation of E. A. Brown last September. Previously he had been superintendent of the laboratory and the blending and treating department.

The Ashland refinery recently completed 257 days without a lost-time accident, while working almost a half-million man-hours, achieving an accident index rate of 2.97 as compared with an average for the entire industry of 17.12.

Fluid Catalysis Consultants

The Marshall-Moorman Development Company, a partnership to offer a consulting and process engineering service to the petroleum and chemical industries on specific new applications of the fluid catalyst technique, has been formed by Walton H. Marshall, Jr., and Joseph W. Moorman, both formerly with The M. M. Kellogg Company. The company will serve as consultants on chemical processes, such as ammonia and methanol syntheses as well as in fluid catalysis.

Mr. Marshall was graduated from Massachusetts Institute of Technology in 1935. He was employed by The Kellogg Company as process engineer from that time until his recent resignation in October, with the exception of three and a half years in the Navy, from which he was discarged with the rank of lieutenant commander.

Mr. Moorman is a graduate of the University of Tulsa. He joined Kellogg in 1937, after spending two years in general construction work. Mr. Moorman's assignments as a process engineer with Kellogg have been primarily on catalytic cracking since 1938.

Discovers New Zone

Continental Oil Company has discovered a new oil producing zone in Wyoming's Circle Ridge field. It was announced by W. C. MacMillan, vice president in charge of production. Continental's Shoshone Well No. 4, on the Shoshone Indian Reservation, 50 miles northwest of Riverton, Wyoming, tested approximately 200 barrels a day at 1,600 to 1,665 feet in the Madison lime, he said. Other production in this immediate area is from the Embartensleep zone, varying in depth from 275 to 800 feet.

Moves To Larger Headquarters

Consolidation of executive and engineering headquarters in new offices has been announced by T. Ellwood Webster, president of Catalytic Construction Company. The new address will be 1600 Walnut Street, Philadelphia 3, Pennsylvania. Executive offices previously had been located at 1608 Walnut Street and engineering offices in the Lewis Tower, Philadelphia. Expansion of company activities has made necessary increased working area.

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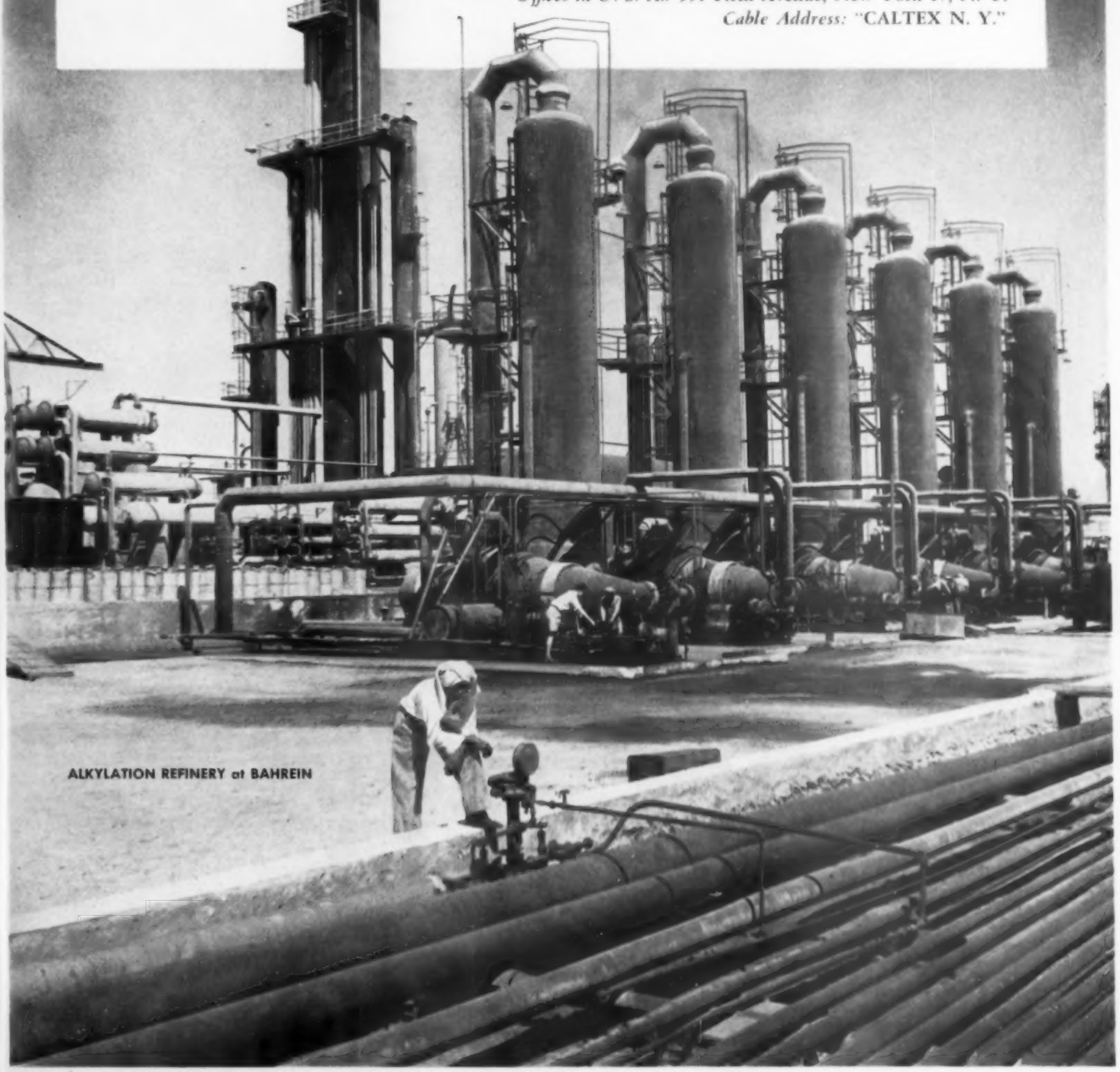

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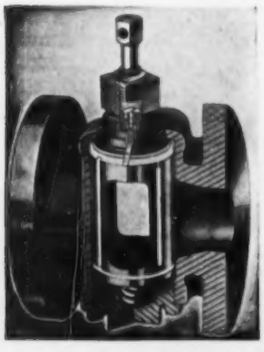

★ This sectioned illustration of a flanged Newman-Milliken Valve shows the cylindrical plug and lubricant ducts which seal the valve against leakage and ensure easy operation at all times. A rectangular port valve is shown, but full round port valves are also manufactured.

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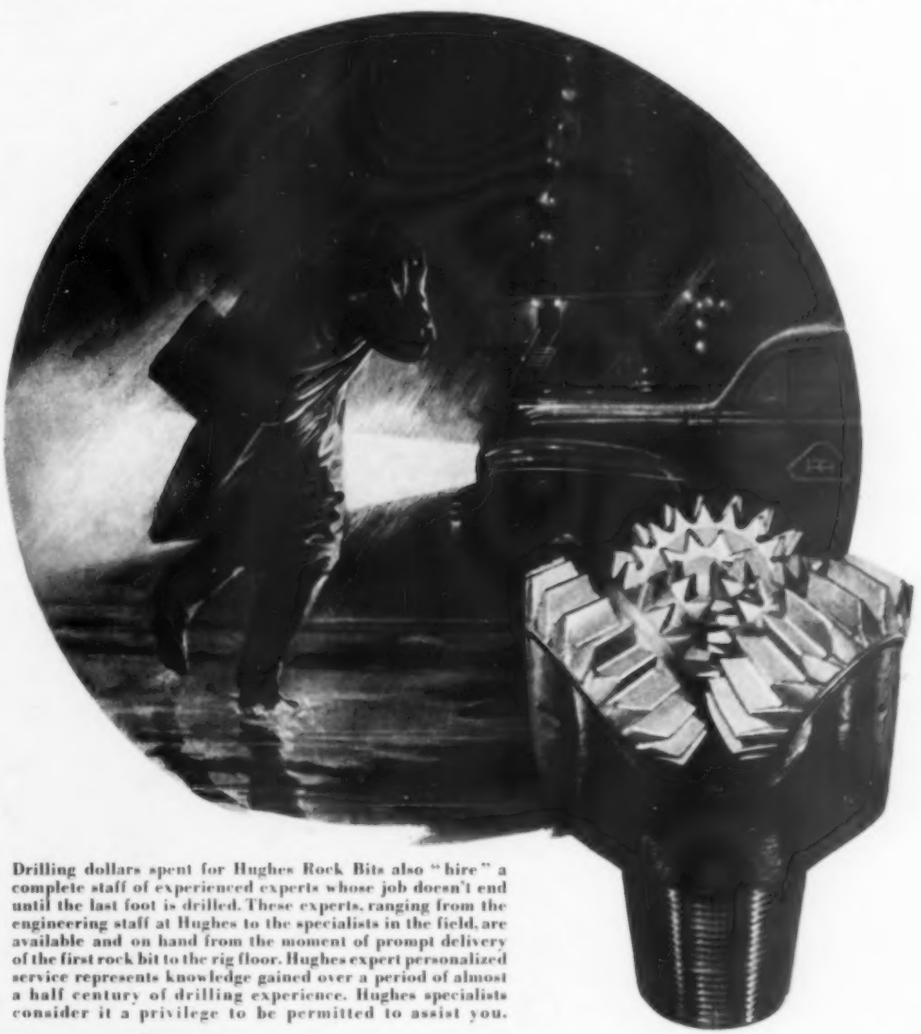

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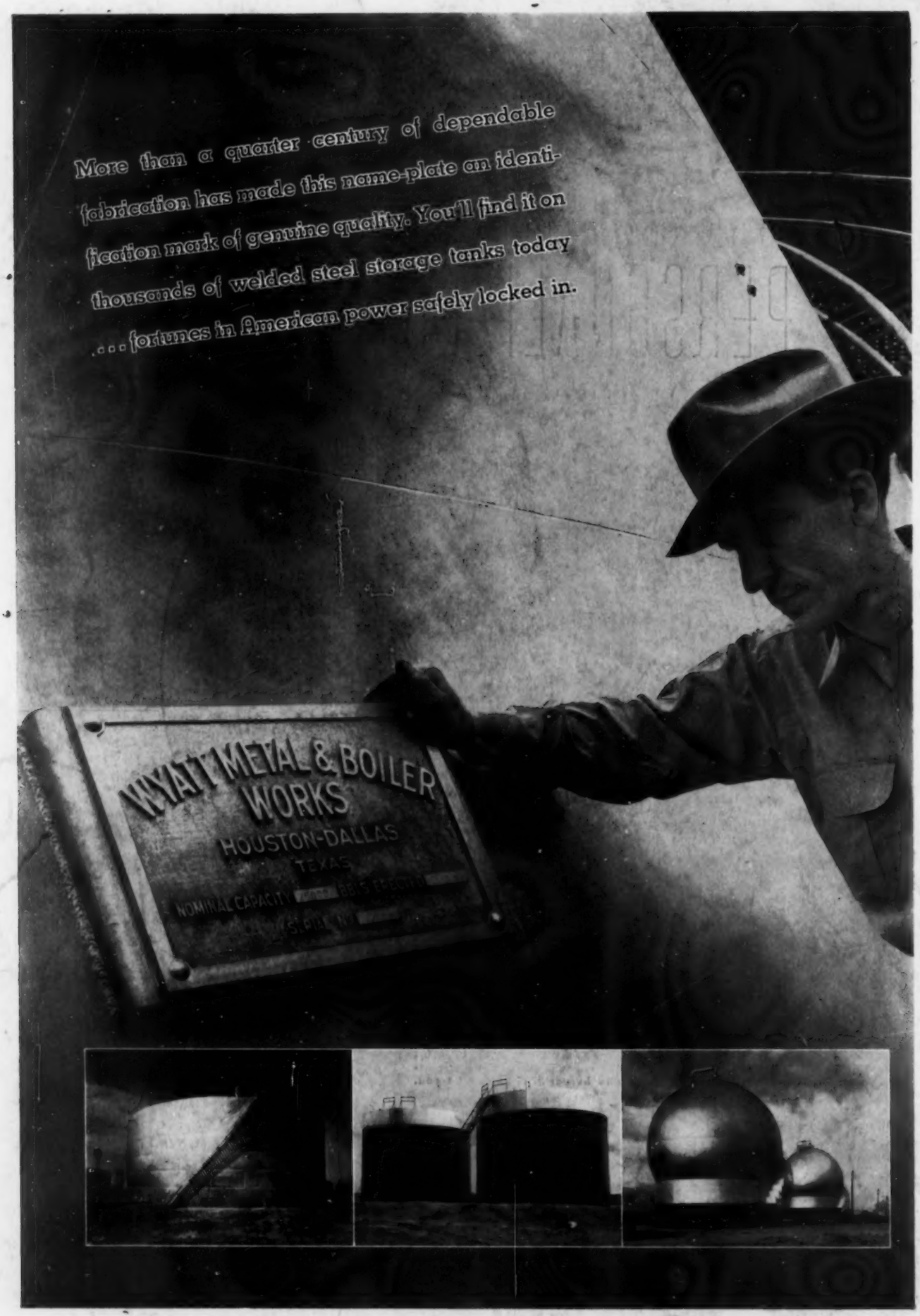
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